UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IN RE: METHYL TERTIARY BUTYL ETHER ("MTBE") PRODUCTS LIABILITY LITIGATION

Master File No. 1:00–1898
MDL 1358 (SAS)
M 21-88

This document relates to:

City of Merced Redevelopment Agency v. Exxon Mobil Corp., et al., 08 Civ. 06306 (SAS)

DECLARATION OF DUANE C. MILLER IN SUPPORT OF PLAINTIFF CITY OF MERCED REDEVELOPMENT AGENCY'S OPPOSITION TO DEFENDANTS' MOTION FOR PARTIAL SUMMARY JUDGMENT RE NUISANCE AND TRESPASS
[EXHIBITS 1 -18]

I, Duane C. Miller, hereby declare:

1. I am one of the attorneys in this case for plaintiff City of Merced Redevelopment Agency. I have been personally involved in much of the discovery and pretrial proceedings in this action. This Declaration is based on my personal knowledge and, if called as a witness, I could testify competently thereto.

2. Attached hereto as Exhibit 1 is a true and correct copy of excerpts from the deposition of J.P. Randhawa taken on August 26, 2009.

3. Attached hereto as Exhibit 2 is a true and correct copy of relevant portions from the Expert Report of Marcel Moreau dated April 11, 2011.

4. Attached hereto as Exhibit 3 is a true and correct copy of the declaration of Alexander Blagojevic taken on May 4, 2000.

5. Attached hereto as Exhibit 4 is a true and correct copy of an Email dated May 13, 1998, from C. Stanley to C. Parkinson.

6. Attached hereto as Exhibit 5 is a true and correct copy of excerpts from the May 6, 1999, deposition of Curt Stanley, taken in *South Lake Tahoe Public Utility District v. Atlantic Richfield Company, et al.*

7. Attached hereto as Exhibit 6 is a true and correct copy of an Internal ARCO Memo dated March 31, 1981, from R.N. Roth to MTBE File.

8. Attached hereto as Exhibit 7 is a true and correct copy of excerpts form the Ben Thomas deposition taken on November 15, 2000, in *South Lake Tahoe Public Utility District v. Atlantic Richfield Company, et al.*

9. Attached hereto as Exhibit 8 is a true and correct copy of a letter dated October

17, 2005, from W. Hughes to R. Greenwald.

10. Attached hereto as Exhibit 9 is a true and correct copy of a letter dated October 17, 2005, from P. Condron to R. Greenwald.

11. Attached hereto as Exhibit 10 is a true and correct copy of a letter dated September 15, 2005, from T. Renfroe to R. Greenwald.

12. Attached hereto as Exhibit 11 is a true and correct copy of a Memo dated June 18, 1984, from S. Cragg, API, to MTBE Task Force.

13. Attached hereto as Exhibit 12 is a true and correct copy of ARCO Chemical Company Internal Correspondence dated June 14, 1984, from B. Hoover to S. Ridlon.

14. Attached hereto as Exhibit 13 is a true and correct copy of Hydrocarbons and Organic Chemicals in Groundwater - Prevention, Detection and Restoration, dated November 12-14, 1986.

15. Attached hereto as Exhibit 14 is a true and correct copy of excerpts from the Valero Corporate Representative Deposition, Early Knowledge and Taste & Odor Issues.

16. Attached hereto as Exhibit 15 is a true and correct copy of excerpts from the deposition of Joel Masticelli taken July 26, 2000, in *South Tahoe Public Utility District.*

17. Attached hereto as Exhibit 16 is a true and correct copy of a Memorandum dated June 11, 1986, to O.T. Buffalow, San Francisco, CA, from D.W. Callahan.

18. Attached hereto as Exhibit 17 is a true and correct copy of a Memorandum re MTBE dated December 30, 1986.

19. Attached hereto as Exhibit 18 is a true and correct copy of Ultramar Material Safety Data Sheet dated June 30, 1994.

20. Attached hereto as Exhibit 19 is a true and correct copy of an August 12, 1991, Memorandum, TIP Letter #237, MTBE Effects [CHEV 09564-09567.]

21. Attached hereto as Exhibit 20 is a true and correct copy of Memorandum, Chemical Entry Review for MTBE, dated March 26, 1991.

22. Attached hereto as Exhibit 21 is a true and correct copy of an Email from C. Stanley to D. McGill dated July 14, 1993.

23. Attached hereto as Exhibit 22 is a true and correct copy of Memo re MTBE in Ground Water Issue dated April 27, 1995.

24. Attached hereto as Exhibit 23 is a true and correct copy of an Email dated May 14, 1998, from C. Stanley to K. Bell.

25. Attached hereto as Exhibit 24 is a true and correct copy of an Email dated November 3, 1998, from C. Stanley to J. Pedley.

26. Attached hereto as Exhibit 25 is a true and correct copy of MTBE Release Source Identification at Marketing Sites dated March 30, 1999.

27. Attached hereto as Exhibit 26 is a true and correct copy of an email dated January 20, 1999, from Hugh Dickey to multiple recipients attaching "Solving Problems from MTBE Contamination - It's Not Just Regulating Underground Tanks."

28. Attached hereto as Exhibit 27 is a true and correct copy of an Email dated February 2, 1999, from C. Stanley to F. Benton.

29. Attached hereto as Exhibit 28 is a true and correct copy of an Email dated May 29, 1998, from G. Marshall to C. Stanley.

30. Attached hereto as Exhibit 29 is a true and correct copy of an Email dated March

12, 1999, from G. Marshall to C. Stanley.

31. Attached hereto as Exhibit 30 is a true and correct copy of a June 25, 1996, Letter from P. Pugnale, Shell Oil Company, to R. Ghirelli, California Regional Water Quality Control Board.

32. Attached hereto as Exhibit 31 is a true and correct copy of a letter dated September 29, 1997, from C.E. Flanikan, Ultramar, to California Environmental Protection Agency with attachment.

33. Attached hereto as Exhibit 32 is a true and correct copy of excerpts from the deposition of Arvel Shackelford taken May 18, 2009, in *City of Merced.*

34. Attached hereto as Exhibit 33 is a true and correct copy of excerpts from the deposition of Robert C. Donovan taken August 31, 2000, in *South Tahoe Public Utility District.*

35. Attached hereto as Exhibit 34 is a true and correct copy of a letter dated October 17, 2005, from Diana Pfeffer Martin to Robin Greenwald.

36. Attached hereto as Exhibit 35 is a true and correct copy of 1988 Health & Environmental Project Proposals.

37. Attached hereto as Exhibit 36 is a true and correct copy of excerpts from the deposition of Brian Pazin taken on August 25, 2009, in *City of Merced.*

38. Attached hereto as Exhibit 37 is a true and correct copy of American Petroleum Institute Memorandum dated February 16, 1988, from David Chen.

39. Attached hereto as Exhibit 38 is a true and correct copy of relevant portions of the First Amended Complaint filed on March 4, 2013.

40. Attached hereto as Exhibit 39 is a true and correct copy of Minutes for the Public

Focus Meeting dated December 17, 1986.

41. Attached hereto as Exhibit 40 is a true and correct copy of a Memorandum dated February 13, 1987, to O.B. Smith.

42. Attached hereto as Exhibit 41 is a true and correct copy of a Memorandum dated January 8, 1987, to Bob Drew from Judy Shaw.

43. Attached hereto as Exhibit 42 is a true and correct copy of a letter dated February 12, 1987, to Beth Anderson.

44. Attached hereto as Exhibit 43 is a true and correct copy of a letter dated February 27, 1987, to Beth Anderson.

45. Attached hereto as Exhibit 44 is a true and correct copy of a 1988 Health & Environmental Project Proposal.

46. Attached hereto as Exhibit 45 is true and correct copy of the relevant portion of Expert Report of Marcel Moreau dated April 11, 2011, section III.

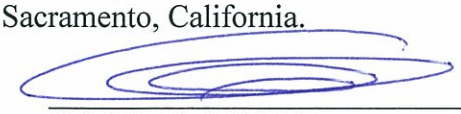
47. Attached hereto as Exhibit 46 is a true and correct copy of Cracker Barrel Meeting Remarks dated January 1995.

48. Attached hereto as Exhibit 47 is a true and correct copy of excerpts from the deposition of Richard Pazin taken on August 24, 2009, in *City of Merced.*

49. Attached hereto as Exhibit 48 is a true and correct copy of relevant portions of Supplement Response of ExxonMobil Corporation to Special Interrogatories Set Three dated September 15, 2010.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 29th day of April, 2013, at Sacramento, California.



DUANE C. MILLER

EXHIBIT 1

IN THE SUPERIOR COURT FOR THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF MERCED
-oOo-

CITY OF MERCED,
Plaintiff,
vs.
CHEVRON U.S.A., INC.; SHELL OIL COMPANY; EXXONMOBIL CORPORATION; EXXON CORPORATION; KINDER MORGAN ENERGY PARTNERS L.P.; EQUILON ENTERPRISES LLC; SFPP, L.P. and DOES 1 THROUGH 200, inclusive,

Defendants.
_____/

Case No. 148451

COPY

DEPOSITION OF J.P. RANDHAWA

August 26, 2009 at 9:00 a.m.

Before: ERIC L. JOHNSON
RPR, CSR #9771
Taken at:
Merced, California

MS. STANDIFER: Rose Standifer from Reed Smith. I represent Kinder Morgan and SFPP.

MS. VANDERLAAN-SMITH: Nicole Vanderlaan-Smith from Latham & Watkins. I represent ConocoPhillips Company.

THE VIDEOGRAPHER: Will the court reporter please swear in the witness.

J.P. RANDHAWA,

the Witness herein, having been duly and regularly sworn by the Certified Shorthand Reporter, deposed and testified as follows:

EXAMINATION BY MR. MILLER

MR. MILLER: Q. Good morning. Could you please give us your name and business address.

A. My name is J.P. Randhawa and the business address is 1415 R Street, Merced, 95340.

Q. And what is the name of the business?

A. R Street Texaco.

Q. Do you recall the date that you first became associated with that business?

A. Yes, September 1994.

Q. And did you purchase the business from someone?

A. Yes.

Q. And who was that?

A. Arvel Shackelford.

Q. Is that the first time that you have owned or operated a gas station, that is, when you opened the R Street Texaco?

A. Yes.

Q. Did you receive any training or attend any classes that were sponsored by Texaco?

A. Well, at that time we were with Exxon.

Q. Okay. The Shackelford's called their business the R Street Exxon; is that --

A. Yeah, I believe it was R Street Exxon at that time. Yeah.

Q. Okay. And how long was it before you changed the business over to R Street Texaco?

A. I believe it was 1999.

Q. Between 1994 and 1999, was the business continuously operated as R Street Exxon?

A. Exxon, yeah.

Q. When you first made arrangements to acquire this business, did you attend any classes sponsored by Exxon?

A. I don't believe so.

Q. Did anyone who was working at the station attend classes, to your knowledge, sponsored by Exxon?

A. No.

Q. When the gas station switched its name to

A. Yes.

Q. And that's been your full-time employment?

A. Full-time, right.

Q. When the station was initially acquired from the Shackelfords and operated as R Street Exxon, were you selling Exxon branded gasoline?

A. Exxon branded gasoline, yeah.

Q. And was the Exxon name displayed at the station?

A. Yes, it was.

Q. Was it your understanding that you had an agreement that permitted you to display Exxon's name and sell branded gasoline?

A. I don't remember anything like that.

Q. Okay.

A. Only thing I know, we were buying gasoline from Courtesy Oil out of Turlock.

Q. As best you can recall, the first supplier of gasoline to the station after you took it over was Courtesy Oil of Turlock?

A. It was Courtesy Oil, yeah.

Q. And did it stay Courtesy Oil from the beginning of the time the station was opened under your ownership, until it became R Street Texaco?

A. It was Courtesy Oil from '94 to June of '99.

Q. And what occurred in June of '99?

A. Well, we had to upgrade the tanks, the deadline was '98, December. So we closed the station down, I believe, in either November of '98 or December of '98, to secure the funding so we can do the upgrade.

Q. And when the upgrades were completed, you opened the station under a new name, R Street --

A. R Street Texaco in '99, June. And my supplier at that time was Dickey Petroleum, they are also from Turlock.

MR. TEMKO: How do you spell that, sir?

THE WITNESS: Dickey, D-i-c-k-e-y, Petroleum.

MR. TEMKO: Thank you.

MR. MILLER: Q. To the best of your recollection, until you switched to Dickey Petroleum did you continuously buy all of your gasoline from Courtesy Oil?

A. No, Dickey Petroleum.

Q. My question wasn't clear. Let me try again.

A. Okay.

Q. Before Dickey Petroleum --

A. Okay. Before Dickey Petroleum.

Q. Did you buy all of your gasoline products from Courtesy Oil?

A. From Courtesy Oil, yeah.

Q. And when you started buying from Dickey Petroleum of Turlock, did you buy exclusively from them --

A. Exclusively from them, because we were under contract.

Q. And the contract provided that you could have Texaco branded gasoline?

A. Texaco only, yeah.

Q. And you had Texaco's name up on the station?

A. On the station, yeah.

Q. And on the dispensers?

A. On the dispensers as well.

Q. Did anyone assist you with the upgrades to the underground storage tank system that you completed by June of 1999?

A. Like financially?

Q. I am more interested for the moment in professional assistance. Did you hire someone --

A. Yes, we hired a company out of Fresno. It is called Westar.

Q. And what were they hired to do, if you can briefly describe that for me, please.

A. They were hired to remove the existing tanks, install new tanks, install new canopy, and install new pumps.

Also, try to remember it becomes harder later in the day. I am not going to step on your answer, don't step on my question. If we both talk at the same time, he's got a huge problem trying to take it down accurately, and we want a good record.

Now, did Texaco provide any financial assistance in making these upgrades or any guidance concerning it?

A. Yeah, that was the main reason I went with Dickey Petroleum at that time, because they offered -- Texaco offered, I believe it was, $79,000.

Q. Was that a loan or what, the $79,000?

A. It wasn't a loan, but I think it was a rebate that you get like every gallon you sell, but they paid that up front.

Q. And by paying it up front, it helped finance the construction?

A. Yeah, definitely. Because at that time, I mean, the property was contaminated. I mean, nobody would lend me the money. I came across a private lender out of Fresno, they lent me money for 13 percent interest, eight -- yeah, 13 percent.

Q. Okay. We are going to come back to that subject later.

Did Texaco suggest who you should select as a

MR. MILLER: Q. Was it your understanding that Courtesy Oil had an agreement with Exxon that permitted them to sell Exxon branded gasoline?

A. Yeah.

Q. And was it your understanding that during that period of time, all of the gasoline that you were selling was Exxon gasoline?

A. Exxon gasoline, yeah.

MS. JONES-ROY: Calls for speculation.

MR. MILLER: Q. And you had the logo -- the Exxon logo on your dispensers?

A. Dispensers, price sign, freeway sign.

Q. And as far as you knew, you were authorized through Courtesy Oil by Exxon to do that; is that correct?

A. Correct.

MS. JONES-ROY: Calls for a legal conclusion; assumes facts not in evidence.

MR. MILLER: Q. During the time you were selling Exxon gasoline, did you even know MTBE was in the gas?

MS. JONES-ROY: Assumes facts not in evidence.

THE WITNESS: No.

MR. MILLER: Q. Did they ever give you any warnings about MTBE, in particular, where they told you

with Courtesy Oil, correct?

A. Courtesy Oil, yeah.

Q. And then following the upgrade of the station, after you reopened the station in 19 -- in June of 1999, you at that point had --

A. Dickey Petroleum.

Q. -- an arrangement with Dickey Petroleum?

A. Yeah.

Q. And then at some point, let me check the notes, but --

A. End of 2005 with Pazin & Myers.

Q. And that's the period when you --

A. Switched from -- see, I was with Texaco, with Dickey Petroleum, but I think that Texaco was owned by Shell at that time because I was able to take Texaco and Shell credit card over there. And Pazin & Myers came in, and I was Chevron for almost a year and a half, then switched back to Texaco. Now I am able to take both credit cards, Texaco and Chevron's.

Q. But you no longer take Shell credit card?

A. No, no.

Q. Did you ever have any contractual relationship with Shell Oil company?

A. Directly, no. I don't think so.

Q. Did you ever have any contractual relationship

STATE OF CALIFORNIA)
(ss.
COUNTY OF STANISLAUS)

I, ERIC L. JOHNSON, do hereby certify that I am a licensed Certified Shorthand Reporter, duly qualified and certified as such by the State of California;

That prior to being examined, the witness named in the foregoing deposition was by me duly sworn to testify to tell the truth, the whole truth, and nothing but the truth;

That the said deposition was by me recorded stenographically at the time and place herein mentioned; and the foregoing pages constitute a full, true, complete and correct record of the testimony given by the said witness;

That I am a disinterested person, not being in any way interested in the outcome of said action, or connected with, nor related to any of the parties in said action, or to their respective counsel, in any manner whatsoever.

DATED: September 4, 2009

Eric L. Johnson, CSR, RPR

EXHIBIT 2

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

In re: Methyl Tertiary Butyl Ether ("MTBE") Products Liability Litigation

Master File No. 1:00-1898
MDL 1358 (SAS)
M21-88

This Document Relates To:

City of Merced Redevelopment Agency v. Exxon Mobil Corp., et al., 08 Civ. 06306 (SAS)

EXPERT REPORT OF MARCEL MOREAU

Marcel Moreau Associates
73 Bell Street
Portland, ME 04103

Marcel Moreau
Signature

April 11, 2011
Date

Qualifications

I am a nationally recognized expert in underground petroleum storage systems. Since 1983 I have worked exclusively in the petroleum storage field, chiefly in the areas of regulation, storage system design, leak detection technology, and regulatory compliance assessment.

I have served as consultant to many private and governmental clients, including the U.S. Environmental Protection Agency (EPA), the Chesapeake Division of the U.S. Navy, the Petroleum Equipment Institute, the American Petroleum Institute, and the California State Water Resources Control Board.

I have provided technical training concerning underground storage systems to state regulatory personnel in Alabama, Alaska, Arizona, California, Colorado, Delaware, District of Columbia, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, New Hampshire, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin and Wyoming.

I have authored a chapter discussing the federal underground tank regulatory program in the *Handbook of Storage Tank Systems,* a textbook sponsored by the Steel Tank Institute.

I am a regular columnist for the U.S. EPA newsletter L.U.S.T.Line, and an occasional contributor to the steel tank industry newsletter Tank Talk.

I have co-authored a paper entitled "MTBE as a Ground Water Contaminant," published in the 1986 *Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Ground Water – Prevention, Detection and Restoration – A Conference and Exposition* co-sponsored by the American Petroleum Institute and the National Water Well Association.

As a consultant to the Petroleum Equipment Institute (PEI), I have worked with PEI committees to produce eight industry recommended practices, including:

- *Recommended Practices for Installation of Underground Liquid Storage Systems* (1997, 2000, and 2005 editions),
- *Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling* (1999 and 2003 editions),
- *Recommended Practices for Installation and Testing of Vapor-Recovery Systems at Vehicle-Fueling Sites* (2004 edition),
- *Recommended Procedure for Testing Electrical Continuity of Fuel-Dispensing Hanging Hardware* (2002 edition),
- *Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment* (2005 edition),
- *Recommended Practices for Overfill Prevention for Shop-Fabricated Aboveground Tanks* (2007 edition),
- *Recommended Practices for the Inspection and Maintenance of UST Systems* (2008 edition),
- *Recommended Practices for the Design and Maintenance of Fluid-Distribution Systems at Vehicle Maintenance Facilities* (2009 edition), and
- *Recommended Practices for the Installation of Marina Fueling Systems* (2009 edition).

I have discussed storage tank issues with editors from the trade publications National Petroleum News and Convenience Store News, and the television news magazine 60 Minutes.

Since 1991, I have been the president of Marcel Moreau Associates in Portland, Maine, a firm providing information and educational services related to petroleum storage systems for government, industry trade organizations, and private sector clients.

A significant facet of my professional career is the analysis of underground storage system failure.

I have testified as an expert witness regarding the sources and potential effects of MtBE releases from underground gasoline storage tanks in several prior MtBE litigations, including:

- *City of New York v. Amerada Hess et al., United States District Court, Southern District of New York,* MDL No. 1358, Master File C.A. No. 1:00-1898 (SAS),
- *South Tahoe Public Utility District v. Atlantic Richfield Co., et al. San Francisco Superior Court Case No. 999128,*
- *Communities for a Better Environment v. Unocal Corp., et al., San Francisco Superior Court Case No. 997013, and*
- *Dunne, et al. v. Shell Oil Company, Index #96-13856T, Supreme Court of the State of New York, County of Westchester.*

Disclosures

A listing of my publications and the cases in which I have provided deposition and trial testimony is contained in my curriculum vitae which is attached to this report as Appendix D.

I am being compensated for my time at the rate of $275 per hour. No portion of my compensation is contingent upon the outcome of this litigation.

Assignment

At the request of plaintiffs, Marcel Moreau Associates was asked to review documents relating to underground storage systems at facilities located in the City of Merced, California area. The purpose of the document review was to identify, in so far as possible, the source, duration, and volume of petroleum releases from the storage systems installed at these facilities. Opinions regarding the source, duration, and volume of releases were to be based solely on storage system tightness testing results, maintenance and service records, fuel inventory

records, and the presence or absence of petroleum contaminants in soils adjacent to the storage systems.

Methodology

The facilities selected for study were identified by others. Various documents were provided to Marcel Moreau Associates. These files were indexed and arranged chronologically. The document indexes were then reviewed to glean information relating to petroleum releases that have occurred at these facilities. Chronological summaries of significant events for each facility were then produced based on the documents contained in the facility index. Narrative summaries providing a history of the storage systems, descriptions of release events that have been identified, and the evidence for the presence of contamination at each facility were also produced.

Results

The results of my analysis in this case are consistent with the analyses I have conducted in similar cases. The presence of subsurface contamination typically provides evidence of one or more releases from an underground storage system, but there is little or no supporting documentation from tightness testing, maintenance, or inventory records to establish the source, duration, or volume of the release. This is true of most the facilities that I was asked to examine in this case.

A study conducted in California found that 92 percent of release incidents were discovered because of the presence of subsurface contamination rather than the use of commonly utilized leak detection methods.[1] The results of my investigation in this case are consistent with the findings of this study. Releases came to the attention of regulatory agencies primarily because of excavation and associated soil sampling activities. For further discussion

[1] *Analysis of California UST & LUST Programs and the Impacts of MtBE and Ethanol to California*, prepared by Anne Happel for the U.S. Department of State, Office of the Legal Adviser, December 2003, p. 27.

of this topic, see the section in my general report for this case that describes the effectiveness of leak detection.

Opinions

Based on a review of available documents, I have developed the following opinions in this case:

- For the specific facilities reviewed in this case, releases can be documented by means of soil analyses at every facility where soil sampling data exist.
- Because excavation was the dominant method of discovering releases at these facilities, it was very often not possible to identify the specific component of a storage system that failed.
- It was not possible to provide precise estimates of the duration or volume of releases based on fuel inventory records because there were very few inventory records among the documents reviewed.
- Although the volume and duration of releases in most cases could not be determined using testing results, maintenance records, and inventory records, evidence that releases have occurred is indisputable. That we most often have little knowledge concerning the duration or volume of a release is a testament to the carelessness with which fuel was handled, not that a release never happened.

NOTE: Other experts in this case may provide estimates of the source, duration, and volume of fuel released based on geological or hydrogeological evidence. The inadequacy of the available tightness testing, maintenance, and inventory records to determine the source, duration, and volume of releases does not imply that the source, duration, and volume of fuel released cannot be derived from other lines of evidence or that releases did not occur.

The opinions expressed in this report are based on the information and documents that I have reviewed to date. I reserve the right to modify these opinions in light of any additional information that may come to my attention.

"R" Street Exxon
1415 "R" Street, Merced

R Street Exxon

1415 R St, Merced

NOTE: For the purposes of investigation and remediation, the California Regional Water Quality Control Board (CRWQCB) attributed the groundwater pollution detected in the 1400 block of R Street as combined releases from the Pacific Pride Cardlock Station (Pacific Pride) at 1455 R Street and the adjacent R Street Exxon (Exxon) at 1415 R Street. The tank fields of these two facilities are approximately 50 feet apart. The R Street Exxon station is located to the south of the Pacific Pride station. Shallow groundwater flow direction is generally to the north.

SITE OWNERSHIP HISTORY

1963 – 1980	Mobil station
1992	R Street Exxon
1999	R Street Texaco

a/k/a/ R Street Chevron, 1415 R Street, Facility ID: 1528, LOP# 24162

MAJOR MILESTONES

~1963	Service Station first operated at this site.
Dec 1991	Unauthorized Release Report (URR) was filed for an estimated 20-gal release that occurred on 12/20/1990 during a tightness test.
1992	MtBE first added to gasoline produced by Exxon's Benecia refinery.
Oct 1995	Start of quarterly groundwater monitoring. Floating product was observed in two monitoring wells, one on-site and one to the northeast.
March 1996	Merced County Division of Environmental Health (MCDEH) directed the site to include MtBE as an analyte in the next groundwater sampling event.

Feb 1997	MCDEH classified the site as a "high risk groundwater" site due to the presence of free phase hydrocarbons.
Oct 1997	MTBE was detected in well MW-K (located adjacent to the Pacific Pride tank field) at 40,000 ppb. [12 17 1997]
Aug 1998	MCDEH maintained that R Street Exxon (and not the downgradient Pacific Pride station) was the source of the groundwater problem in the area.
Feb 1999	Two 6,000 gal tanks (one gasoline, one diesel), one 8,000 gal tank (gasoline), and one 250 gal tank (waste oil) and associated product lines and dispensers were removed from the site. These tanks replaced with two 12,000 gal Plasteel double-walled tanks.
Jan 2000	Startup of the soil vapor extraction (SVE) remediation system.
April 2000	Startup of the air sparging (AS) remediation system.
Dec 2000	The MTBE concentration measured in monitoring well MW-K, located adjacent to the Pacific Pride USTs, was 3,100,000 ppb.
March 2002	California Regional Water Quality Control Board (CRWQCB) notified the site that the magnitude of the groundwater pollution identified, the rate of spreading of the pollution, and the threat posed to the public water supply necessitated the rapid implementation of remedial measures, more aggressive and comprehensive than the existing remediation system.
March 2003	The CRWQCB notified site that the large mass of gasoline dissolved in groundwater and the floating product layer (up to 4.64 feet thick) necessitated immediate and on-going remediation.
Dec 13, 2004	CRWQCB reiterated that current remediation efforts were not substantial enough to remediate the large mass of petroleum hydrocarbons in the area, including a substantial mass of free-phase gasoline, contaminated soil, and heavily polluted shallow groundwater.
June 2005	SVE and air sparging remediation systems were taken offline. [5 2 2007]
May 2006	CRWQCB notified the facility that remediation of the plume was not progressing satisfactorily.
May 9, 2007	MCDEH notified the Merced Mayor that 168,000 pounds (28,000 gallons) of contaminants had been removed from the subsurface, but the plume continued to migrate toward the municipal drinking water supply well.
Feb 2008	Final Feasibility Study for remediation of the Former Exxon and Pacific Pride UST Site was issued. This report estimated that 452,684 pounds

(75,000 gal) of gasoline hydrocarbons and 27,231 pounds (4,500 gal) of MtBE remained in the ground.

SPILL/LEAK EVENT CHRONOLOGY

Jan 4, 1990	Leak detected in the vapor line under the no-lead pump during testing.
Dec 20, 1990	A 20-gallon fuel release occurred during tank integrity testing of regular gasoline tank. The leak resulted from the failure of a plate on the submersible pump during tank testing.
Dec 10, 1991	Unauthorized Release Report (URR) was filed for the leak that occurred on 12/20/1990 (see above). MCDEH requested that the extent of the release be assessed.
Feb 10, 1998	MCDEH noted that the USTs and product lines at R Street Station were last tested in 1994. DEH directed R Street Exxon to have all USTs and product lines tested within 30 days.
March 20, 1998	Review of site records revealed that fuel inventory was not being reconciled daily (if at all).
Feb 19, 1999	Two 6,000 gal tanks (one gasoline, one diesel), one 8,000 gal tank (gasoline), and one 250 gal tank (waste oil) and associated product lines and dispensers were removed from the site. Tanks removed were single-walled steel, with no exterior or interior protection. Piping was also single-walled. There was no spill containment or overfill protection [7 28 1998]. The tanks were described as being in good condition with no holes. Very strong gasoline odors were noted in tank and piping excavations, and the backfill was discolored. Closure report cited possible overfill contamination at all three tanks, and a possible pipeline leak at one of the 6,000 gal tanks.
Feb – May 1999	New USTs were installed: two 12,000 gal Plasteel double-walled tanks, one of which was divided into two compartments for gasoline and diesel fuel storage.
March 25, 2002	CRWQCB directed site to immediately review inventory control and leak detection systems and procedures for evidence of a leak or a reportable spill.
Aug 22, 2002	Two hundred tank gauge test results were produced to MCDEH in a paper bag. A great many results were "fail." MCDEH letter noted that

the records fell short of meeting minimum standards and that the facility was not in a position to demonstrate that it had not contributed to the contamination in the immediate vicinity.

SOIL/GROUNDWATER CONTAMINATION CHRONOLOGY

Aug 1992	A subsurface investigation was conducted in the area prior to development of a Costco site; eight soil borings and 13 groundwater monitoring wells were installed. The investigators identified potential sources of fuel releases contributing to contamination in the vicinity of Costco as: a former Phillips 66 service station (now Waterbed Outlet), the R Street Exxon Station, the Pacific Pride Cardgas site, the Smith Van and Storage site, and the former California Tomato Growers site..
March 1996	MCDEH directed site to include MtBE as an analyte in the next groundwater sampling event.
Feb 20, 1997	MCDEH agreed that the site had been adequately characterized (39 soil borings, 17 monitor wells installed, 13 serviceable monitor wells), and that the extent of contamination had been assessed to the extent practicable. MCDEH agreed there were multiple offsite sources for contamination, and ordered removal of free phase petroleum product to the maximum extent practicable. The site was named a "high risk groundwater" site due to the presence of free phase hydrocarbons. MCDEH directed site to analyze for MtBE in wells that had elevated detection limits (up to 2,000 ppb) in the previous sampling round.
Dec 17, 1997	MCDEH noted in a review of the 3rd Quarter Groundwater Monitoring Report that MTBE was detected in MW-K (located adjacent to the gasoline USTs) at 40,000 ppb. MtBE was not detected in samples from this well during the previous two quarters. [12 17 1997]
4th Qtr 1997	The presence of MtBE in MW-K was confirmed at 99,000 ppb.
June 1998	Soil vapor extraction wells were installed (SVE-1 & SVE-2 just north of the tank field).
1999	Two more soil vapor extraction wells were installed (SVE-3 & SVE-4 just south of the tank field); eight air sparge wells were installed.
Feb 19, 1999	MCDEH observed the storage system removal. No holes were noted in the tanks, but there was soil contamination. Soil samples taken. One sample from beneath a piping run was described as "very contaminated...black soil." Lab results for this piping sample were ND

	for all constituents. Another sample from beneath a tank was also described as "very contaminated – gray color." Lab results for this tank sample were ND except for xylene at 78 ppb. (see March 17, 1999 entry.)
Mar 17, 1999	MCDEH wrote that lab analyses of soil samples taken during the tank removal were suspect because the holding time was too long, there was no chain of custody form, and "...there is no correlation between the data and site findings made by two of our staff members."
April 2, 1999	New soil samples taken by MCDEH from approximately the same locations as the day of the tank removal. Odors were noticeable throughout the site, especially in the SW and SE corners of the tank excavation and one of the piping samples. Dispenser sample D-2 showed MtBE at 4,200 ppb. Piping sample L-5 showed MtBE at 500 ppb. Tank excavation sample T-10 showed MtBE at 60 ppb. Tank excavation sample T-12 showed MtBE at 570 ppb. Some samples that were ND for MtBE had very high (1,000,000 ppb) detection limits.
Jan 2000	Startup of the SVE system.
April 13, 2000	Air sparging implemented.
Dec 20, 2000	MtBE concentration of 3,100,000 ppb measured in MW-K, located on the downgradient Pacific Pride fueling facility, adjacent to the USTs.
2001	Soil vapor extraction wells SVE-5 and SVE-6 were installed on the Pacific Pride site. Three feet of product was measured in SVE-5. Tertiary butyl alcohol (TBA) and tertiary amyl methyl ether (TAME) were detected at 4,400,000 ppb and 75,000 ppb in MW-K(s) in June 2001. MW-5 was installed (downgradient well), and three shallow wells were installed adjacent to existing wells to monitor floating product thickness more accurately (MW-F(S), MW-G(S), and MW-K(S)) because well screens for previously installed wells were below the water table. [3 25 2002]
Aug 18, 2002	Three feet of floating product were reported under a substantial portion of the site and the adjacent Pacific Pride site. Prior to 2002 there had only been a fraction of an inch of floating product. The recent increase in floating product at the site suggested a recent (or ongoing) release, although groundwater table fluctuation had been suggested as an alternative explanation.
Nov 2002	Five product extraction wells (W-1 through W-5) were installed at the pacific Pride site. Free product was detected in each well.

Jan 2, 2003	During a recent monitoring event, 4.39 feet of floating product was found in MW-5, located in 15th St. just west of R. Street. That measurement represents an increase of over 4 feet in three weeks. The same three week period saw dramatic increases in the level of floating product in MW-1, 3 and 4, which are located on the Pacific Pride site.
Jan 8, 2003	In a file memo, floating free product beneath the site was estimated to be between 5,000 and 20,000 gallons
Jan 22-Feb 12, 2003	Product was removed via high vacuum extraction. Product was extracted sequentially from W-1, W-3, and W-5. An estimated 5,900 gallons (36,200 pounds) of gasoline were removed. This activity seemed to have little effect on reducing the quantity of free-floating product. [3 17 2003]
Mar 5-Apr 14, 2003	A second high vacuum dual phase extraction event was conducted – two units operating simultaneously this time. Operation was interrupted from March 10 to Mar 24 to allow for a Tracer test. Wells W-3 and W-5 were pumped. By April 11, the thickness of free product was reduced only modestly. Pumping switched to wells W-4 and MW-K(s). After three days, free product did not appear to be significantly affected. An estimated total of 58,723 pounds of hydrocarbons was removed (equivalent to 9,790 gal of gasoline) for all wells over the entire period. [5 15 2003]
May 2003	Five additional SVE wells were installed (SVE-7 through SVE-11) on the Pacific Pride site.
June 2003	A subsurface assessment was conducted to further evaluate the extent of the hydrocarbon plume. Ten cone penetrometer test (CPT) borings were advanced, and soil and groundwater samples were collected. In addition, 10 monitoring wells were installed.
Sept 23, 2003	A Subsurface Assessment Report and Monitoring Well Workplan was issued. The MtBE concentration in the groundwater sample from CPT-6 (located north of the site) was 97,000 ppb.
Oct 2003	A soil vapor extraction (SVE) remediation system was started up
Dec 23, 2003	From 10/13/2003 to 11/23/2003, an estimated 4,932 lbs of TPHg were removed by the SVE system, including 89 lbs of BTEX and 207 lbs of MtBE. Floating product measurements were taken during late Oct and

	early Nov 2003 in SVE wells as well as selected wells on the adjacent Pacific Pride site. SVE-1 and 2 contained no floating product, while floating product thickness ranged from 0.7 to 1.2 ft in the remaining wells. Five wells at the Pacific Pride site contained floating product at thicknesses from 1.8 to 2.6 ft.
Dec 31, 2003	Over 3 feet of floating, very clean, free product was measured in well W-5 at the northern edge of the Pacific Pride property.
Jan 21, 2004	Merced County expressed concern about the rate of lateral movement of the shallow MtBE plume northward, towards the municipal water supply well.
Dec 13, 2004	CRWQCB commented on the high level of free-phase product (1.9 feet) reported to be floating on the groundwater surface near the west side of R Street. The CRWQB believed that the data indicated a substantial mass of free-phase gasoline, contaminated soil, and heavily polluted shallow groundwater was present in the area. The CRWQCB concluded that petroleum hydrocarbons in this area were not being substantially remediated by present efforts.
June 2005	The SVE and air sparging remediation systems were discontinued because of low influent vapor concentrations. [5 2 2007]
May 2, 2006	CRWQCB notified the facility that remediation of the commingled plume was not progressing satisfactorily.
May 9, 2007	MCDEH notified the Merced Mayor that 168,000 pounds (28,000 gallons) of contaminants had been removed from the subsurface but the plume continued to migrate toward the municipal drinking water supply well.
Feb 1, 2008	Final Feasibility Study for Former Exxon and Pacific Pride UST Site issued. This report estimated that there was still 452,684 pounds (75,000 gal) of hydrocarbons and 27,231 pounds (4,500 gal) of MtBE in the ground.

IDENTIFICATION OF MTBE RELEASES

Tank Area Releases

In December of 1990, A 20-gallon fuel release occurred during tank integrity testing of regular

gasoline tank. This incident occurred prior to the introduction of MtBE into Exxon gasoline and did not contribute to the MtBE contamination present at this facility.

In February of 1999, the storage tanks and associated piping and dispensers were removed. Strong odors were noted in the excavation and one soil sample taken from the bottom of the tank excavation was described as "very contaminated" (emphasis in original). When these samples came back essentially clean, MCDEH took another round of samples and the soil analyses were repeated. The second round of laboratory analyses showed that one soil sample from the bottom of the tank excavation at the submersible turbine pump end of the tank contained MtBE at 570 ppb [4 2 1999]. Some tank excavation samples that were non-detect for MtBE had detection limits as high as 1,000,000 ppb.

Up to two feet of free product was detected in well SVE-1 (12/28/2001) and 0.37 feet in well SVE-2 (4/7/2003) [5 15 2003]. These wells were adjacent to the R Street Exxon tank field in a downgradient direction. These wells were upgradient of the Pacific Pride storage systems, so the presence of free product in SVE-1 and SVE-2 points to releases from the R Street Exxon site.

The presence of MtBE contaminated soil in the bottom of the tank excavation, confirms that releases from the storage tanks that were in service prior to 1999 contributed to the MtBE contamination present in this area of Merced. Field observations at the time the tanks were removed point to overfilling of the tanks as a possible cause of this contamination. Leaks from the submersible turbine pumps and the piping adjacent to the pumps are another likely cause of contamination in the storage tank area.

Releases from the gasoline tanks would have been intermittent and would have occurred throughout the time these storage tanks were in operation. Releases that occurred after MtBE was present in gasoline would have contributed to the MtBE contamination in this area.

Piping and Dispenser Area Releases

In January of 1990, a leak was detected in the vapor line under the no-lead pump during a tightness test. This leak occurred prior to the introduction of MtBE into Exxon gasoline and did not contribute to the MtBE contamination present at this facility.

During the storage system removal in 1999, one native soil sample from beneath a piping run was described as "very contaminated...black soil." [2 19 1999] A soil sample from beneath a piping run contained MtBE at 500 ppb. A soil sample from beneath a dispenser contained MtBE at 4,200 ppb [4 2 1999].

There is clear evidence of MtBE contamination in soils beneath the fuel piping and dispensers at this facility. The timing and duration of the leaks in the fuel piping and dispensers is not known, but at least some of the gasoline released included MtBE.

Customer Spills

Although no customer spills at this facility were reported, such spills are common at vehicle fueling facilities and no doubt occurred throughout the time this facility was in operation. Customer spills may have contributed to the MtBE contamination that was discovered in the area of the fuel piping and dispensers.

Pacific Pride Cardlock (Cardgas)
1455 "R" Street, Merced

Pacific Pride Cardlock (Cardgas)

1455 R St, Merced

NOTE: For the purposes of investigation and remediation, the California Regional Water Quality Control Board (CRWQCB) attributed the groundwater pollution detected in the 1400 block of R Street as combined releases from the Pacific Pride Cardlock Station (Pacific Pride) at 1455 R Street and the adjacent R Street Exxon (Exxon) at 1415 R Street. The tank fields of these two facilities are approximately 50 feet apart. The R Street Exxon station is located to the south of the Pacific Pride station. Shallow groundwater flow direction is generally to the north.

SITE OWNERSHIP HISTORY

1983	Pacific Pride Cardlock, 1455 "R" Street, (sometimes written as 1460 R St.), Facility ID: 1224

MAJOR MILESTONES

1983	Four underground storage tanks (USTs) were installed: a 12,000 gal diesel tank, a 10,000 gal regular gasoline tank, a 10,000 gal unleaded gasoline tank, and an 8,000-gal super unleaded tank. The tanks were single-walled steel with no corrosion protection, and piping was single-walled with a pressurized pumping system.
July 1992	A diesel release was reported due to a customer driving off with the nozzle still in the vehicle; 30 gallons of fuel spilled and were cleaned up with absorbent (sand).
Summer 1996	a major facility upgrade was completed: USTs were reportedly cleaned, tested, and internally lined; piping was replaced; leak detection equipment was installed; and new procedures for leak detection monitoring were established.
Oct 1997	MTBE was detected in MW-K (located adjacent to the Pacific Pride USTs) at 40,000 ppb. [12 17 1997]

Aug 1998	An impressed current corrosion protection system was installed.
Aug 1998	The Merced County Division of Environmental Health (MCDEH) maintained that the upgradient R Street Exxon was the source of the groundwater problem in the area.
Dec 2000	The MTBE concentration measured in monitoring well MW-K, located adjacent to the Pacific Pride USTs, was 3,100,000 ppb.
March 2002	California Regional Water Quality Control Board (CRWQCB) notified the site that the magnitude of the groundwater pollution identified, the rate of spreading of the pollution, and the threat posed to the public water supply necessitated the rapid implementation of remedial measures, more aggressive and comprehensive than the existing remediation system.
May 2002	There was approximately 2 feet of free product in MW-K (located near the Pacific Pride tank field).
July 2002	A Soil Assessment Report concluded that it was highly likely that the Pacific Pride site had experienced a gasoline leak from the dispensers, the fuel piping, or both, and that releases might be continuing.
Jan 2003	Due to large increases in the amount of free product present at the site, MCDEH issued a Notice of Violation (NOV) and Order to Comply directing Pacific Pride to cease operations and empty all tanks unless certain requests for compliance documents and testing were immediately met.
March 2003	The CRWQCB notified the site that the large mass of gasoline dissolved in groundwater and the floating product layer (up to 4.64 feet thick) necessitated immediate and on-going remediation.
Jan 2004	The storage tanks at the Pacific Pride site were removed and replaced with aboveground tanks. Soil samples from the bottom of the tank excavation indicted the presence of TPHg and MtBE contamination.
Dec 13, 2004	The CRWQCB commented that current remediation efforts were not substantial enough to remediate the large mass of petroleum hydrocarbons in the area, including a substantial mass of free-phase gasoline, contaminated soil, and heavily polluted shallow groundwater.
May 2, 2006	The CRWQCB notified the facility that remediation of the plume was not progressing satisfactorily.
May 9, 2007	The MCDEH notified the Merced Mayor that 168,000 pounds (28,000 gallons) of contaminants had been removed from the subsurface, but the

	plume continued to migrate toward the municipal drinking water supply well.
Feb 1, 2008	A Final Feasibility Study for Former Exxon and Pacific Pride UST Sites was issued. This report estimated that 452,684 pounds (75,000 gal) of gasoline hydrocarbons and 27,231 pounds (4,500 gal) of MtBE remained in the ground.

SPILL/LEAK EVENT CHRONOLOGY

Jul 7, 1992	Approximately 30 gal of diesel fuel were released after a vehicle drive-off. The spill was cleaned up using sand as an absorbent.
June 17, 1998	A Tracer tightness test was conducted on the Pacific Pride tanks. The Tracer testing was for the tanks only, there were no sampling points in piping or dispenser areas. While the test concluded that the tanks were tight, all nine sample points showed hydrocarbon values in the soil vapor ranging from 6,458 ppb to 84,741 ppb. Also, a hand-written note indicated that fuel was present in the unleaded submerged turbine pump sump.
Nov 22, 1999	Summary of MCDEH inspection findings: Three of the four submersible turbine sumps were found to contain an inch or less of liquid. The unleaded sump had a "Gas/ether odor." Only the super sump was dry. There were two different markings on the sidewall of the plus sump indicating that there had been liquid within the sump. The highest mark was 6 or 7 inches from the bottom. Three electrical conduit sump penetration boots in the plus sump were torn. At least three of the dispenser sumps were found to contain liquid.
July 25, 2002	An Unauthorized Release Report (URR) documented the release of an unknown quantity of gasoline containing MtBE from an unknown source. The discovery method was listed as a Soil Assessment Report dated 7/22/2002. [7 26 2002].
Jan 9, 2003	MCDEH reported that significant petroleum residue was evident inside most dispensers. Also, there was a failure of a nitrogen test on secondary containment for one tank, and failure of the no-lead primary product pipe and secondary containment to pass a pressure check. Monitor well MW-K had a cam lock connector on it just like the tank fills and was not locked.
Jan 14, 2003	A contractor noted to MCDEH inspector that the no-lead line had a

	probable leak. This line later tested tight. The inspector also noted that, "Northern Lights Mechanical tightened many fittings on fuel meter assemblies in dispensers," and that " Disp #1/2 secondary containment would not hold." [1 14 2003].
April 8, 2003	Enhanced Leak Detection Results indicated primarily vapor releases. A high vacuum vapor extraction event was interrupted in order to conduct this test. Based on tracer detection, MCDEH considered that an unauthorized release had occurred from tank 2 (see 5 19 2003). Tank 3 (NL) tracer and petroleum vapor concentrations were consistent with small vapor release. Tank 4 (Super) had no tracer detected. There was a small tracer detection at location 18 (near the main gasoline dispenser island - 1.2 ppb) that could be indicative of a small vapor release from the product piping. In addition, 22,700 ppb of petroleum vapor was detected in the shallow soil at location 15 (near the northeastern dispenser island) that was consistent with a small liquid release at this location. No tracer currently detected at this location.
May 19, 2003	Based on tracer test results, MCDEH believes there has been an unauthorized release from Tank 2, the mid-grade gasoline tank.
Jan 8, 2004	All four USTs were removed and replaced with aboveground tanks. The piping was left in place and no piping soil samples were taken. The tanks were reported to have moderate surface corrosion with no obvious holes. There was no noticeable discoloration for the diesel, super and no-lead tanks, and a slight discoloration in the backfill of the plus tank. Native soil had some discoloration and odor from the plus and super tanks. A leak report was filed. The highest TPHg was in the soil sample collected at the super tank (3,300,000 ppb). The highest MtBE concentrations were in soil samples from the no-lead tank (93 and 200 ppb). CRWQCB concluded that the results of the soil sampling from the UST removal were supportive of the determination that petroleum hydrocarbons released from the site had impacted soil and groundwater; however, the specific point(s) of release remained undetermined. [2 10 2004].

SOIL/GROUNDWATER CONTAMINATION CHRONOLOGY

Aug 1992	A subsurface investigation was conducted in the area prior to development of a Costco site; eight soil borings and 13 groundwater monitoring wells were installed. The investigators identified potential sources of fuel releases contributing to contamination in the vicinity of Costco as: a former Phillips 66 service station (now Waterbed Outlet),

	the R Street Exxon Station, the Pacific Pride Cardgas site, the Smith Van and Storage site, and the former California Tomato Growers site.
Dec 17, 1997	MCDEH noted in a review of the 3rd Quarter Groundwater Monitoring Report that MTBE was detected in MW-K (located adjacent to the gasoline USTs) at 40,000 ppb. MtBE was not detected in samples from this well during the previous two quarters. [12 17 1997]
4th Qtr 1997	Presence of MtBE in MW-K was confirmed at 99,000 ppb.
Dec 20, 2000	An MtBE concentration of 3,100,000 ppb was measured in MW-K, adjacent to the Pacific Pride USTs.
2001	Soil vapor extraction wells SVE-5 and SVE-6 were installed on the Pacific Pride site. Three feet of product was measured in SVE-5. Tertiary butyl alcohol (TBA) and tertiary amyl methyl ether (TAME) were detected at 4,400,000 ppb and 75,000 ppb in MW-K(s) in June 2001. MW-5 was installed (downgradient well), and three shallow wells were installed adjacent to existing wells to monitor floating product thickness more accurately (MW-F(S), MW-G(S), and MW-K(S)) because well screens for previously installed wells were below the water table. [3 25 2002]
Jun 17, 2002	Of six soil borings advanced at the facility, three in the vicinity of the main dispenser island show olfactory evidence of gasoline contamination.
July 26, 2002	Seven soil borings were completed in the vicinity of the USTs and dispensers. Soil samples were collected to a depth of 24.5 feet below ground surface (bgs). Groundwater was encountered at roughly 20 feet bgs. Petroleum hydrocarbons were encountered in soil samples from 10 and 15 ft bgs from three borings, with the highest concentrations of TPHg above 1,000,000 ppb. All soil samples contained MtBE and tertiary-butyl alcohol (TBA), with concentrations above 100,000 ppb in many samples. Visible free phase hydrocarbons were observed at 24 feet bgs in two borings. The report concluded that it was highly likely that the site had experienced a gasoline leak from the dispensers, fuel piping, or both, and that releases may be continuing.
Aug 18, 2002	Three feet of floating product were reported under a substantial portion of the site and the adjacent Pacific Pride site. Prior to 2002 there had only been a fraction of an inch of floating product. The recent increase in floating product at the site suggested a recent (or ongoing) release, although groundwater table fluctuation had been

	suggested as an alternative explanation.
Nov 2002	Five product extraction wells (W-1 through W-5) were installed at the Pacific Pride site. Free product was detected in each well.
Jan 2, 2003	MCDEH issued a Notice of Violation (NOV) and an Order to Comply as a result of serious soil and groundwater petroleum contamination in the area. Dramatic increases in product thickness were measured from 11/18/2002 to 12/11/2002: 1-ft in MW-1; 3.3-ft in MW-3; 0.7-ft in MW-4; and 4.2-ft in MW-5. Wells MW-1, MW-3 and MW-4 are located on the Pacific Pride site, and MW-5 is located in 15th St, just west of R Street. MCDEH directed the facility to cease operation of the USTs on midnight, Jan 2, 2003, and to remove all product within 24 hours of ceasing operation. Discussions with regulators and facility personnel followed.
Jan 8, 2003	In a file memo, floating free product beneath the site was estimated to be between 5,000 and 20,000 gallons
Jan 22-Feb 12, 2003	Product was removed via high vacuum extraction. Product was extracted sequentially from W-1, W-3, and W-5. An estimated 5,900 gallons (36,200 pounds) of gasoline were removed. This activity seemed to have little effect on reducing the quantity of free-floating product. [3 17 2003]
Mar 5-Apr 14, 2003	A second high vacuum dual phase extraction event was conducted – two units operating simultaneously this time. Operation was interrupted from March 10 to Mar 24 to allow for a Tracer test. Wells W-3 and W-5 were pumped. By April 11, the thickness of free product was reduced only modestly. Pumping switched to wells W-4 and MW-K(s). After three days, free product did not appear to be significantly affected. An estimated total of 58,723 pounds of hydrocarbons was removed (equivalent to 9,790 gal of gasoline) for all wells over the entire period. [5 15 2003]
May 2003	Five additional SVE wells were installed (SVE-7 through SVE-11) on the Pacific Pride site.
June 2003	A subsurface assessment was conducted to further evaluate the extent of the hydrocarbon plume. Ten cone penetrometer test (CPT) borings were advanced, and soil and groundwater samples were collected. In addition, 10 monitoring wells were installed.
Sept 23, 2003	A Subsurface Assessment Report and Monitoring Well Workplan was

	issued. The MtBE concentration in the groundwater sample from CPT-6 (located north of the site) was 97,000 ppb.
Oct 2003	A soil vapor extraction (SVE) remediation system was started up.
Dec 23, 2003	From 10/13/2003 to 11/23/2003, an estimated 4,932 lbs of TPHg were removed by the SVE system, including 89 lbs of BTEX and 207 lbs of MtBE. Floating product measurements were taken during late Oct and early Nov 2003 in SVE wells as well as selected wells on the adjacent Pacific Pride site. SVE-1 and 2 contained no floating product, while floating product thickness ranged from 0.7 to 1.2 ft in the remaining wells. Five wells at the Pacific Pride site contained floating product at thicknesses from 1.8 to 2.6 ft.
Dec 31, 2003	Over 3 feet of floating, very clean, free product was measured in well W-5 at the northern edge of the Pacific Pride property.
Jan 21, 2004	Merced County expressed concern about the rate of lateral movement of the shallow MtBE plume northward, towards the municipal water supply well.
Dec 13, 2004	CRWQCB commented on the high level of free-phase product (1.9 feet) reported to be floating on the groundwater surface near the west side of R Street. The CRWQB believed that the data indicated a substantial mass of free-phase gasoline, contaminated soil, and heavily polluted shallow groundwater was present in the area. The CRWQCB concluded that petroleum hydrocarbons in this area were not being substantially remediated by present efforts.
June 2005	The SVE and air sparging remediation systems were discontinued because of low influent vapor concentrations. [5 2 2007]
May 2, 2006	CRWQCB notified the facility that remediation of the commingled plume was not progressing satisfactorily.
May 9, 2007	MCDEH notified the Merced Mayor that 168,000 pounds (28,000 gallons) of contaminants had been removed from the subsurface, but the plume continued to migrate toward the municipal drinking water supply well.
Feb 1, 2008	A Final Feasibility Study for Former Exxon and Pacific Pride UST Site was issued. This report estimated that 452,684 pounds (75,000 gal) of gasoline hydrocarbons and 27,231 pounds (4,500 gal) of MtBE

remained in the ground.

IDENTIFICATION OF MTBE RELEASES

Tank Area Releases

On June 17, 1998, a Tracer tightness test was conducted on the Pacific Pride tanks. While no active leaks were detected in the tanks, all nine soil vapor samples from the tank area showed hydrocarbon values ranging from 6,458 ppb to 84,741 ppb. The presence of high levels of hydrocarbon vapors in the soil immediately adjacent to the tanks is indicative of prior fuel releases from the tank area.

A hand-written note on the Tracer test results from the June 1998 testing indicated that fuel was present in the unleaded submerged turbine sump. The fuel in this sump could have originated from maintenance activities or a leak in the submersible pump or the adjacent piping. Leaks from submersible pumps and associated piping are common and can result in large volume releases. If the sump were not tight, this fuel could leak into the environment. No tank-top sump tightness test results were reviewed, so the leak status of the submersible pump sumps is not known.

During an inspection on November 22, 1999, the MCDEH noted that three of the four submersible turbine sumps contained an inch or less of liquid. Only the super gasoline sump was dry. The unleaded sump had a "Gas/ether odor." Three electrical conduit sump penetration fittings in the plus sump were torn. Though the exact nature of the liquids present in these sumps is not specified, the "gas/ether" odor in the unleaded sump points to a gasoline release. If the sump were not tight, this fuel could leak into the environment. No sump tightness test results were reviewed, so the leak status of the unleaded submersible pump sump is not known.

On April 8, 2003, results from another Tracer test were reported. Based on tracer and petroleum vapor detections, MCDEH concluded that an unauthorized release had occurred from the plus grade gasoline tank (Tank 2) [5 19 2003]. Tracer and petroleum vapor concentrations in the vicinity of the unleaded tank (Tank 3) were consistent with a small vapor release. No tracer was detected in the vicinity of the super product gasoline tank (Tank 4). The detection of tracer compounds in the environment and the presence of hydrocarbon vapors both indicate that leaks were present in the storage tanks in March of 2003 when the test was conducted. The quantities of tracer detected were small, however, and it is unlikely that the leaks detected by this Tracer test were large enough to account for all of the contamination present in the area.

In January of 2004, all four storage tanks were removed and replaced with aboveground tanks. The tanks were reported to have moderate surface corrosion with no obvious holes. There was no noticeable discoloration of the backfill for the diesel, super and no-lead tanks, and a slight

discoloration in the backfill for the plus tank. Native soil had some discoloration and odor from the plus and super tanks. A tank closure report dated February 10, 2004 noted that the highest TPHg concentration measured was in the soil sample collected beneath the super tank (3,300,000 ppb). The only MtBE detections were in two soil samples from beneath the unleaded tank (93 ppb and 200 ppb). Soil vapor extraction was ongoing at this site, and this may have reduced the levels of soil contamination. [3 10 2004]

The presence of MtBE contaminated soil beneath the unleaded tank in 2004 confirms that there were releases of MtBE gasoline from at least the unleaded tank at the Pacific Pride facility. Some leaks were detected by the tracer test conducted in April of 2003, and earlier releases are indicated by the hydrocarbon vapors detected in the vicinity of the tanks in 1998. The exact source of the releases is not known, but the submersible pumps and adjacent piping are a likely source, and delivery spills likely contributed to the contamination as well.

Releases from the gasoline tanks would have been intermittent and would have occurred throughout the time these storage tanks were in operation. Releases that occurred after MtBE was present in gasoline would have contributed to the MtBE contamination in this area.

Piping and Dispenser Area Releases

On July 7, 1992, approximately 30 gal of diesel fuel were released after a vehicle drive-off. The spill was cleaned up using sand as an absorbent. Because this was a spill of diesel fuel before the time when MtBE was prevalent in the fuel supply, this spill most likely did not contribute to the MtBE contamination at this site.

In July of 2002, seven soil borings were completed in the vicinity of the storage tanks and dispensers. Soil samples collected from above the groundwater level showed levels of TPHg of 1,000,000 ppb and levels of MtBE and TBA above 100,000 ppb. [7 26 2002] These soil borings were completed in the vicinity of the main dispenser island. [6 17 2002] These soil samples confirm that there were substantial releases of gasoline containing MtBE from the dispensers and/or piping at the Pacific Pride facility.

In January 2003, the MCDEH reported that there was significant petroleum residue evident inside most of the dispensers at the Pacific Pride facility. [1 9 2003] Notes from a MCDEH site visit indicated that a pump and tank contractor, Northern Lights Mechanical, "...tightened many fittings of fuel meter assemblies in dispensers." [1 14 2003] The MCDEH also reported that the secondary containment for dispenser 1/2 "...would not hold." [1 14 2003]

In March of 2003 another Tracer test was conducted. [4 8 2003] A tracer detection at location 18 (near the main gasoline dispenser island - 1.2 ppb) indicated a small active vapor release from the product piping. In addition, 22,700 ppb of petroleum vapor was detected in shallow soil at sample location 15 (near the northeastern dispenser island) indicating a past liquid release at this location. A high vacuum dual phase extraction event was interrupted to conduct the Tracer test, so the soil vapor hydrocarbon levels measured during this Tracer test may have

been reduced by the large volume of vapors extracted immediately prior to the tracer test sampling event. Even so, the tracer samples provide evidence of petroleum releases in the dispenser area.

When taken together, the soil boring evidence for contamination in the vicinity of the dispensers, the petroleum residue visible inside the dispenser cabinets, the tightening of many fuel meters, and the failure of the dispenser containment, point to leaky meters as a likely significant contributor to the MTBE contamination present at the Pacific Pride location. The Tracer testing conducted in March of 2003 indicates that other piping leaks also contributed to the MtBE contamination at this site.

Customer Spills

There was only one customer spill of diesel fuel reported for this facility, but customer spills are common at vehicle fueling facilities and no doubt occurred throughout the time this facility was in operation. Customer spills may have contributed to the MtBE contamination that was discovered in the area of the fuel piping and dispensers.

Secondary Containment Releases

Leaks in secondary containment components (e.g., in dispenser sump 1/2 in January 2003) are not in themselves indicative of a release to the environment. However, these leaks do indicate that if a leak in a dispenser or the associated fuel piping did occur, gasoline could well have escaped into the environment because the secondary barrier intended to contain the leak was not effective.

PROOF OF SERVICE VIA LEXISNEXIS FILE AND SERVE

I, the undersigned, declare that I am, and was at the time of service of the paper(s) herein referred to, over the age of 18 years and not a party to this action. My business address is 1050 Fulton Avenue, Suite 100, Sacramento, CA 95825-4225.

On the date below, I served the following document on all counsel in this action and on plaintiffs' and defendants' liaison counsel in MDL 1358 electronically through LexisNexis File & Serve:

EXPERT REPORT OF MARCEL MOREAU

I declare under penalty of perjury under the laws of the United States of America and the State of California that the foregoing is true and correct.

Executed on April 11, 2011, at Sacramento, California.

MATTHEW POPISH

EXHIBIT 3

DECLARATION OF ALEXANDER BLAGOJEVIC

I, ALEXANDER BLAGOJEVIC, declare:

1. I am employed by Lyondell Chemical Company as marketing manager for the Oxyfuels Business Group. My duties specifically include the marketing and sales of MTBE to refining customers in the Americas. Having previously been employed by Arco Chemical Company, I have held my current position since November 1992. I believe I am the person most knowledgeable presently in the employ of Lyondell Chemical Company with regard to the history of sales of MTBE by Arco Chemical Company to customers on the U.S. West Coast.

2. This Declaration is based upon both my personal knowledge and upon a review of certain sales records.

3. Given the nature of our sales and transportation arrangements with various customers, the ultimate location and use of a parcel of MTBE was not always known to us. Largely because our company's MTBE manufacturing units are located in Channelview, Texas, most of our sales contracts for MTBE have included the shipping term "FOB HOUSTON". We did enter into contracts with some customers by which we agreed to arrange for shipment to terminals in California. In many instances, however, the customer arranged shipment for itself and we delivered into the customer's rail cars, tankships, barges, storage tanks or pipelines at Houston. Although in those circumstances we had no way to be certain whether or not the

product was eventually delivered to the West Coast, our Customer Service employees made attempts to obtain and record that information.

4. In answer to Questions 13 and 14 of the "Notice of Taking Deposition of Arco Chemical", dated March 10, 2000, the first sales and deliveries of MTBE in and to California were made on a spot basis to Oxbow Resources (April 1986), Union Chemical (April 1986), Chevron Research (July 1986) and Kern Oil (October 1986).

5. Question 20 attached to the Notice asked whether or not Arco Chemical Company had sold MTBE, directly or indirectly, to certain companies. The answer to that question is "yes" as to the following companies (or their affiliates): Shell Oil Company; Shell Oil Products Company; Equilon Enterprises, LLC; Exxon Corporation; Tosco Corporation (both directly and as the assignee of certain sales contracts originally negotiated with Unocal Corporation); Chevron U.S.A. Inc.; Atlantic Richfield Co.; Texaco Inc.; BP America Inc.; BP Exploration & Oil Inc.; Ultramar, Inc.; Ultramar Diamond Shamrock Corporation; Unocal Corporation and Wickland Oil Company. I have no recollection and have found no record indicating that Arco Chemical Company ever made sales of MTBE to "Pacific Refining". However, the sales records do show a sale in 1992 of less than 500 gallons to a company in Los Angeles referred to as "PRC".

6. I attach a spreadsheet derived from our sales records showing MTBE sales by Arco Chemical Company to certain customers at destinations within

California between 1986 and 1999, inclusive. See Exhibit "A". The destinations identified on our sales records are in most cases either the port or place of delivery by Arco Chemical or the port or place to which the customer had indicated an intention to ship the product. As shown by the spreadsheet, the answer to Question 15 of the Notice is "yes".

7. The answers to Questions 16 and 17 of the Notice are "yes", as indicated above.

8. The types of documents which were generally created by Arco Chemical Company pertaining to the sale, transport, delivery, supply and/or exchange of MTBE to or with any of the defendants in the South Tahoe Public Utility District ("STPUD") case and any Northern California refineries were:

Invoices to customers;

Product Purchase Agreements;

MTBE Sales Contracts;

Exchange Agreements;

Telexes or Letters confirming spot orders;

Shipping Contracts with customers;

Shipping bills of lading;

Charter Parties or other contracts with transport providers; and

Invoices from transport providers.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration is made this 4th day of May, 2000 at Houston, Texas.

Alexander Blagojevic

EXHIBIT "A"

SALES OF MTBE BY ARCO CHEMICAL COMPANY TO SPECIFIED CALIFORNIA CUSTOMERS BY DESTINATIONS, 1986-1999

(Volume in Gallons rounded to nearest thousand)[1]

CUSTOMER	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
ARCO PRODUCTS CO. EL SEGUNDO									6604					
MARTINEZ								2098						
ANAHEIM							0							
CARSON								2068						
CROCKETT							3576	12252						
LONG BEACH						34137	35631	111551	79469	9441	11150	47928	59934	52126
LOS ANGELES						1259	6347	18685	1051	2100		47		
SAN PEDRO						2077	11456	10868						
ATLANTIC RICHFIELD LOS ANGELES			2985	15207	2966									
LONG BEACH					14478									

[1]Blank box indicates no sales in given year; "0" indicates sales of at least 1 gallon but less than 500 gallons.

CUSTOMER	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CHEVRON, USA (INCLUDING CHEVRON RESEARCH) CROCKETT											5460	5521		
EL SEGUNDO		3578	8320	5472	25763	36302		8586		3318	16580			
RICHMOND			1252		6448	8073	0	2031	11130	0		22499		
LONG BEACH										3732				
WALNUT CREEK						3024					2330			
LOS ANGELES												2700		
EQUILON ENTERPRISES MOPECO														38605
BAKERSFIELD														392
EQUIVA TRADING CO. MOPECO													35022	
LONG BEACH													3780	
EXXON CO. USA BENICIA							3053							
CARSON							3282							
CROCKETT							39362		15457		35239			
HERCULES							506							

CUSTOMER	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
EXXON CO. USA (CONT.)														
LONG BEACH					6182	1010	3248							
SIGNAL HILL				8169	3150		125							
EXXON SUPPLY CO. CROCKETT								34000						
EL SEGUNDO								9783						
LONG BEACH								755						
KERN BAKERSFIELD	49	76	383											
LONG BEACH		2049	5680	6262										
EL SEGUNDO				174										
PRC LOS ANGELES							0							
SHELL OIL CO. SEBASTOPOL											5072			
CARSON							2847	1760				2280		
MARTINEZ								2432						
SELBY					1673									
WILMINGTON				1034	26583	8986								
LONG BEACH					3871									

CUSTOMER	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
TEXACO REFINING & MARKETING BAKERSFIELD							318							
EL SEGUNDO						3822								
SIGNAL HILL				7768	9822	5327								
SAN FRANCISCO				1966										
WILMINGTON		669				1531								
CROCKETT							2112		6183		10219			
LONG BEACH				11207	9054	17140	11790	5411	12241	12453	14776	8968		
LOS ANGELES								672						
MOPECO							10762	14830	12212	14682	33620	41520		
RICHMOND						2721	2076							
SAN PEDRO					11182	2940	1655	3937	2662		15217	7654		
SIGNAL HILL							8668	14906	6300					
UNIVERSITY CITY							1483	9008		3310				
TOSCO REFINING CO. MARTINEZ										0				
CROCKETT												3088		
LOS ANGELES												47132	68319	
SAN FRANCISCO												3212		
LONG BEACH													2062	

CUSTOMER	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
ULTRAMAR, INC. WILMINGTON											1680	5852		
LONG BRANCH												2108		
ULTRAMAR DIAMOND SHAMROCK WILMINGTON												2100		
UNION CHEMICALS LOS ANGELES	7131													
LONG BEACH	790													
SAN FRANCISCO	1307													
UNOCAL (CHEMICAL or REFINING) LOS ANGELES	6276	25460	34114	20772	14059	30669	27616	42653	14423	101951	83949	23201		
LONG BEACH										2315				
BREA					0	1	1							
SAN FRANCISCO		2242	8971	9	1687	5148					7324	6276		
WICKLAND OIL CO SELBY					453									

EXHIBIT 4

Legal Retention at MSXSOC

From: Stanley CC (Curtis) at MSXWHWTC
Sent: Wednesday, May 13, 1998 11:49 PM
To: Parkinson CD (Chris) at OPC
Cc: Gustafson JB at SHELL RESEARCH THORNTON; Sykes RM at SIEP
Subject: MTBE Issues

Chris,

I'm sorry that it has taken me awhile to get back to you on MTBE issues. I know that you are beginning to feel the heat (it will get much hotter). As you are aware, MTBE is one of the biggest environmental issues that US oil companies are facing due to 1) MTBE's wide occurrence in groundwater, 2) MTBE's high migration potential, 3) MTBE's impact on several high visibility municipal well systems, 4) MTBE's very low odor and taste thresholds, and 5) the difficulty and high cost associated with treating MTBE in water. My first association with MTBE was in 1980 at Rockaway, NJ where 4,000 people were tasting ether (MTBE and DIPE) in their water supplied from a municipal well. The problem in the US in now much worse. I hope that the following information will help put the issue in perspective for you. As you are reviewing this information and have any questions, please feel free to call me.

Cal EPA Brfg 3 98.doc

a very well written and balanced paper from a state perspective

MTBE research table 4-98.doc

This is MTBE research conducted by API's Soil/Groundwater Technical Task Force which I chair

EPA MTBE Proj. list

[illegible]

NW California MTBE Advisory P...

California activities mandated by the legislature

MTBE editorial.doc

This is an editorial that the National Ground Water Association requested that I write for the Association of Ground Water Scientists and Engineers (May/June Issue 1998)

mtbefact.doc

This is an API fact sheet from my Task Force

MTBE National Perspective 3.pp...

This is a presentation that I have made to Shell Mgmt

EQ 028732

MTBE Properties.ppt

This is a table that I modified from some of John's work for my editorial

MTBE2.ppt

This is an MTBE remediation presentation that I made to Shell's remediation managers

In addition to the above references, I am in the process of writing two papers on MTBE considerations for RBCA. These papers will be presented 1) next week at the Battelle Conf on Recalcitrant Compounds, and 2) at the NGWA conf on MTBE in LA in June. We are also conducting work with decision analysis tools to help guide our remediation efforts for MTBE.

I'm sure this is much more than you bargained for, but like I said, if you have any questions, I'm only a call away.

Best Regards,

Curtis C. Stanley
Environmental Technology Directorate - Soil and Groundwater
Westhollow Technology Center
(phone-☎) 281-544-7675 (fax-✆)) 281-544-8727
e-mail: ccstanley@shellus.com
(This communication per applicable agreements between our respective companies.)

EXHIBIT 5

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SAN FRANCISCO

--o0o--

SOUTH TAHOE PUBLIC UTILITY DISTRICT,

Plaintiff,

vs

ATLANTIC RICHFIELD COMPANY ("ARCO"); ARCO CHEMICAL COMPANY; SHELL OIL COMPANY; CHEVRON U.S.A., INC.; EXXON CORPORATION; B.P. AMERICA, INC.; TOSCO CORPORATION; ULTRAMAR, INC.; BEACON OIL CO.; USA GASOLINE CORPORATION; SHELL OIL PRODUCTS CO.; TERRIBLE HERBST, INC.; ROTTEN ROBBIE; J.E. TVETEN CORP.; TAHOE TOM'S GAS STATION; THE SOUTHLAND CORP.; PARADISE CHEVRON; and DOES 1 through 600, inclusive,

Defendants.

No. 999128
VOLUME I

--o0o--

THURSDAY, MAY 6, 1999

10:03 A.M.

--o0o--

DEPOSITION OF

CURTIS STANLEY

--o0o--

CATHLEEN SLOCUM, CSR
License No. 2822

EXAMINATION

By DUANE C. MILLER, Esq., counsel on behalf of the plaintiff:

Q Can we have your name and business address, please?

A Sure. My name is Curtis Stanley. My business address is the Equilon Westhollow Technology Center in Houston, Texas. Is that enough?

Q That's sufficient.

THE VIDEOGRAPHER: Excuse me. We need to swear in the witness.

MR. MILLER: Correct.

10:05:30 am (Witness sworn.)

MS. DOYLE: So now really tell him your true address.

THE WITNESS: The same.

MR. MILLER: Q Mr. Stanley, I'd like you to briefly relate your educational background starting with college for us, please.

A I have a bachelor of science in geology from North Carolina State University with a specialization in engineering. That is my formal education and then other

10:06:00 am education that I've received was on-the-job training while at Shell and now Equilon.

Q And basically you were employed by the Shell Oil Company since you graduated from North Carolina State

University?
A That's correct.
Q And you are currently responsible for hydrogeological evaluation of Shell's facilities nationwide and on the West
10:06:30 am Coast immediately prior to Equilon becoming involved; is that correct?
A In my career I've had responsibility for evaluating facilities. Currently my primary responsibility is in regard to development and implementation of risk-based corrective action.
Q When you were employed by Shell you had responsibility to evaluate retail gasoline stations; is that correct?
10:07:00 am A Yes.
Q And you had that responsibility for the West Coast for a period of time for manufacturing facilities; is that correct?
A That's correct.
Q And you also had that responsibility nationwide for Shell for gasoline stations at one time; is that correct?
A That's correct.
Q And what period of time are we talking about when you had that responsibility?
A For retail?
Q Yes.
A As I recall probably starting in 1980 extending into

the mid-eighties.
Q And when you had those responsibilities, were you responsible among other things for investigating leaks of gasoline?
A Yes.
Q And in that respect did you go to Rockaway, New Jersey in approximately 1980?
A Yes.
Q What was the problem in Rockaway, New Jersey?
A MTBE and diisopropyl ether had been found in the municipal water supply for Rockaway, New Jersey.
Q And why as a Shell Oil Company employee were you interested in that?
A There was an indication that that, the concentrations of those oxygenates, those oxygenates in the water supply, were potentially from one of our service stations located upgradient of the site.
Q Didn't you confirm that Shell was the source of that problem?
A We confirmed that we were part of that problem.
Q In 1980?
A 1980, 1981.
Q Okay. And during that investigation were you in charge of that investigation on behalf of Shell?
A Yes.

CERTIFICATE OF CERTIFIED SHORTHAND REPORTER

I, CATHLEEN S. SLOCUM, a Certified Shorthand Reporter, in and for the State of California, duly appointed and commissioned to administer oaths, do hereby certify:

That I am a disinterested person herein; that the witness, CURTIS STANLEY, named in the foregoing deposition, was by me duly sworn to testify the truth, the whole truth, and nothing but the truth; that the deposition was reported in shorthand by me, Cathleen S. Slocum, a Certified Shorthand Reporter of the State of California, and thereafter transcribed into typewriting.

IN WITNESS WHEREOF, I have hereunto set my hand as Certified Shorthand Reporter on this 15 of May, 1999.

Cathleen Slocum
Certified Shorthand Reporter
License Number 2822

--o0o--

EXHIBIT 6

AtlanticRichfieldCompany Internal Correspondence MAT-9

Date: March 31, 1981

Subject: Pre Study Conference

From/Location: R. N. Roth, AP-479

To/Location: File, MTBE

On March 27, 1981, I attended a conference of the MTBE study group. The purposes of this meeting were to review the status of the pre-study work for Phase I of the MTBE toxicity studies; review the studies with the third party auditor Tracor-Jitco and to review any protocol changes made to the planned teratology and reproduction studies.

Highlights of the discussion are given below:

General

1. ARCO has sent technical material to the laboratory for use in the inhalation studies. Analytical information on the material is available and will be sent out by API.

2. Although not present, Ben Thomas of Shell sent a message that Shell has been involved in the contamination of a township's drinking water with DIPE (disopropyl ether) and 100 ppb MTBE. According to Ben, approximately 20% of all underground gasoline storage tanks leak, leading to the possibility of ground water contamination. This ground water contamination may have to be considered when long term testing is considered. It might also make the NTRP rat study of TBA in the drinking water more applicable .
To date, Shell and ARCO are the only ones with MTBE in gasoline.

Reproduction - Teratology Studies

A question arose over what supplier to obtain rats from. Bio/dynamics has a history of SDA virus. Charles River's Kingston facility, the original supplier, is supposedly SDA free. If animals were ordered from Kingston, they were likely to develop SDA symptoms after arrival. The group considered ordering animals from CR's Portage facility, where animals would already have been exposed to SDA.

The decision was made to stay with Kingston since Bio/dynamics has been getting animals from there for the last nine months and has not experienced any problems. To insure the animals will be SDA-free when the exposure begins, animals will be acclimated for three weeks.

The concentrations of MTBE given in the justification document which were said to produce narcosis were questioned by C. Conoway. I said I would check them.

Details of the study monitoring by Tracor-Jitco will be sent to members by API.

The dates of the reproductive studies depend on when the nine-day probe study is completed.

At my suggestion, a complete water analysis will be done in the middle of the teratology study. This is required by GLP's.

Metabolism Studies

The methods development segment of the metabolism studies is completed. It has been found that the majority of MTBE is eliminated via the lungs within an hour after dosing in the aqueous soluble phase.

Since problems were encountered with hemolysis when MTBE was given I.V., future studies will use the I.P. method of dosing.

Nine-Day Inhalation Study

Prestudy work with the chambers and analytical methods has been completed. The material is being atomized without heating, to consistently generate levels of 100, 300, 1000 and 3000 ppm.

Chamber concentrations will be analyzed using I.R. For future studies, an online GC analysis will be available. Analysis will be done automatically every 15 minutes for 100, 300, and 1000 ppm and manually every ½ hour for 3000 ppm.

Bio/dynamics recommends eliminating the charcoal grab samples of chamber concentration. This was accepted by the group since the accuracy of these samples is questionable.

Tracor-Jitco will monitor the study once during early exposures and the day of necropsy. C. Kerwin, of Phillips Oil will also monitor the study during the necropsies.

Mr. Van Dyke of Bio/dynamics raised a point which deserves further consideration. The metabolic studies which have shown most of the MTBE blown off in the first hour have been done in an unsaturated atmosphere. However, all the toxicity studies will be done in atmospheres in which MTBE concentration is quite high, preventing MTBE from being eliminated so rapidly or completely. This may change the pharmacokinetic profile of

MTBE and result in the metabolic studies not giving an accurate profile of MTBE's fate in the rat. Mr. Van Dyke felt the group may want to do future metabolic work in an MTBE saturated atmosphere. However, the group felt the planned metabolic studies should be completed before considering Mr. Van Dyke's suggestion.

It would appear that the unsaturated atmosphere in the metabolic studies more closely approximates the atmosphere workers will be exposed to.

Overall, I think the planned MTBE studies are moving along very well. If we could be assured of receiving accurate and regular progress reports from Dr. S. Ridlon, I do not think our presence would be necessary at the group meetings since ARCO seems adequately represented by Dr. Ridlon.

cc: J. A. Budny
RNR:mp

EXHIBIT 7

SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF SAN FRANCISCO

SOUTH TAHOE PUBLIC UTILITY DISTRICT, Plaintiff	*	
VS.	*	NO. 999128
ATLANTIC RICHFIELD COMPANY ("ARCO"); ARCO CHEMICAL COMPANY; SHELL OIL COMPANY; CHEVRON U.S.A., INC.; EXXON CORPORATION; B.P. AMERICA, INC.; TOSCO CORPORATION; ULTRAMAR, INC.; BEACON OIL CO.; USA GASOLINE CORPORATION; et al., Defendants	*	

COPY

* *

VIDEOTAPED DEPOSITION OF

BEN THOMAS, Ph.D.

November 15, 2000

* *

Portions of this transcript contain confidential documents, information or other things.

VIDEOTAPED DEPOSITION OF BEN THOMAS, Ph.D., produced as a witness at the instance of the plaintiff, was taken in the above styled and numbered cause on November 15, 2000, from 10:15 a.m. to 4:50 p.m., before Kay Howell, Certified Shorthand Reporter in and for the State of Texas, reported by machine shorthand, at Doubletree Hotel, 400 Dallas, Houston, Texas.

14:10:33 A. Only in detail. I'm afraid I don't remember him.

14:10:39 Q. Were you a member of the Toxicology Committee

14:10:42 until you left Shell in 1990?

14:10:45 A. I was.

(Marked Thomas Exhibit No. 5.)

14:11:15 Q. (BY MR. SHER) I'm handing you a copy of what

14:11:17 I've marked as Exhibit 5 to your deposition. This is on

14:11:24 Atlantic Richfield Company letterhead. It's internal

14:11:29 correspondence dated March 31, 1981, from R. N. Roth to

14:11:34 file, MTBE, and it's Bates stamped ARC 035844 through 46.

14:11:40 Let's go off the record so you can have a chance to look

14:11:43 this over.

14:11:44 THE VIDEOGRAPHER: The time is 2:11 p.m.

(Discussion off the record.)

14:14:52 THE VIDEOGRAPHER: Back on the record at

14:14:53 2:14 p.m.

14:14:54 Q. (BY MR. SHER) Have you had a chance to look over

14:14:57 Exhibit 5 while we were off the record?

14:14:59 A. I have.

14:14:59 Q. Do you have any recollection in the first part of

14:15:03 1981 being involved with a group known as the MTBE Study

14:15:09 Group?

14:15:09 A. This memorandum refreshes my memory, yes.

14:15:12 Q. What is your recollection about that?

14:15:14 A. This was some early studies. As I recall, they

were -- it was a program ongoing when I joined the committee, or at least under discussion when I joined the Toxicology Committee. You know, I apparently have sent information over to Randy Roth of Arco saying that we are involved with a contamination of a township's drinking water with disopropyl ether and MTBE at 100 part per billion. And I reflect the information that I had, that 20 percent of all underground storage tanks leak, leading to the possibility of groundwater contamination.

Q. In the middle of the page there is a reference that says to date Shell and Arco are the only ones with MTBE in gasoline. Do you see that?

A. I do.

Q. Do you have a recollection of a time when Shell and Arco were the only companies with MTBE in their gasoline?

A. I know Shell was a user of MTBE, but I don't know what other companies used it.

Q. Are you aware that over the course of the 80's other companies also started using MTBE?

A. Yes.

Q. Can you recall when the additional companies started using MTBE in rough terms?

A. No, but I would assume it was in the mid-1980's, mid to late 1980's.

STATE OF TEXAS)
COUNTY OF HARRIS)

REPORTER'S CERTIFICATION

TO THE DEPOSITION OF BEN THOMAS, Ph.D.

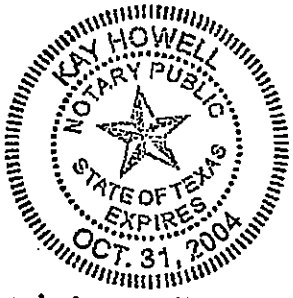
Taken on November 15, 2000

I, KAY HOWELL, Certified Shorthand Reporter in and for the State of Texas, hereby certify that this deposition transcript is a true record of the testimony given by the witness named herein, after said witness was duly sworn by me.

I further certify that I am neither attorney nor counsel for, related to, nor employed by any of the parties to the action in which this testimony was taken. Further, I do not have any existing or past financial, business, professional, family, or social relationships with any of the parties or their attorneys which to some might reasonably create an appearance of partiality.

Upon conclusion of the deposition, the deponent requested the opportunity to review the transcript and make changes in form or substance.

Subscribed and sworn to on this the 27th day of November, 2000.



KAY HOWELL, CSR, RPR, FAPR
Supreme Court of Texas
Certification No. 501
Expiration: 12-31-02

Dickman Davenport, Inc.
3000 Carlisle, Suite 113
Dallas, Texas 75204
214-855-5100

EXHIBIT 8

Wallace King Domike & Branson

WALLACE KING DOMIKE & BRANSON, PLLC
1050 THOMAS JEFFERSON STREET, N.W.
WASHINGTON, DC 20007

Phone 202.204.1000
Fax 202.204.1001

William F. Hughes
Direct Dial 202.204.3727
bhughes@wallaceking.com

October 17, 2005

Via LexisNexis File & Serve

Robin L. Greenwald
Weitz & Luxenburg, P.C.
180 Maiden Lane, 17th Floor
New York, New York 10038-4925

Re: In re: MDL 1358 Products Liability Litigation

Dear Ms. Greenwald:

On behalf of the Chevron Defendants, this letter provides information responsive to Judge Scheindlin's August 12, 2005 directive regarding disclosure of involvement in national and regional trade associations on issues related to oxygenates and/or underground storage tanks ("USTs"). Based upon their investigation thus far, the Chevron Defendants provide the following information:

American Petroleum Institute

Defendant Chevron Corporation[1] has been a member of the American Petroleum Institute ("API") since a date prior to the relevant time. On various occasions during the relevant time period, certain employees of Chevron Corporation and/or affiliated entities, including defendant Chevron U.S.A. Inc., participated in various API committees that may have addressed certain matters related to oxygenates and/or USTs. These committees include: (1) Ad Hoc MTBE Coordination Group; (2) Soil/Groundwater Technical Task Force; (3) MTBE Research Group; (4) RFG Certification Work Group; (5) Ad Hoc RFG Certification Protocol Subgroup; (6) Section 211(b) Research Group; (7) Ad Hoc Oxygenates Group; (8) Clean Air Act Ad Hoc Committee on PPC; (9) Toxicology Committee; (10) Petroleum Industry Workgroup on Methanol Research; (11)

[1] Chevron Corporation has operated under several names during the relevant time period: (1) Standard Oil Company of California (from a date prior to 1979 until July 1984), (2) Chevron Corporation (July 1984-Oct. 2001 and May 2005-present), and (3) ChevronTexaco Corporation (Oct. 2001-May 2005). These entities are referred to collectively herein as Chevron Corporation.

Fuels Committee; (12) Fuels Task Force; (13) Water Subcommittee Water Quality and Water Protection Task Force; and/or (14) Vehicle Emissions Task Force.[2]

Western States Petroleum Association

Defendant Chevron Corporation and/or affiliated entities have belonged to the Western States Petroleum Association ("WSPA") since a date prior to the relevant time period.[3] On various occasions during the relevant time period, employees of Chevron Corporation and/or affiliated entities participated in the following WSPA committees that may have addressed certain matters related to oxygenates and/or USTs: (1) MTBE Task Force; (2) Ad Hoc MTBE Task Force; (3) Ad Hoc WSPA MTBE Treatability Task Force; (4) RFG Advocacy Task Force; (5) Fuels Subcommittee RFG Compatibility Issues Technical Task Force; (6) Ad Hoc RFG Group; (7) Remediation Task Force; (8) Toxic Air Contaminant Task Force; and/or (9) Ad Hoc Group on MTBE.

Other Industry Organizations

On various occasions during the relevant time period, Chevron Corporation and/or affiliated entities (including defendant Chevron U.S.A. Inc.) were members of and/or participated in the following industry associations that may have addressed certain matters involving oxygenates and/or USTs: (1) Independent Petroleum Association of America; (2) Interstate Technology Resource Council; (3) National Petrochemical Refiners Association; (4) National Petroleum Council; (5) Petroleum Environmental Research Forum; (6) Reformulated Gasoline Survey Association; (7) Resource Environmental, LLC; (8) Society of Automotive Engineers; (9) Society of Independent Gasoline Marketing America; (10) Western Petroleum Marketers Association; and/or (11) certain divisions of U.S. Oil & Gas.

The Chevron Defendants provide this information to the best of their knowledge. The Chevron Defendants are continuing their investigation and reserve the right to amend and/or supplement this response should they discover additional information.

[2] Prior to 1984, defendant Chevron U.S.A. Inc. was known as Gulf Oil Corporation. From a date prior to the relevant time period until approximately 1984, Gulf Oil Corporation was a member of API. Defendant Texaco Inc. was a member of API from a date prior to the relevant time period until 2001.

[3] Prior to 1988, WSPA was known as the Western Oil and Gas Association.

Sincerely,

William F. Hughes

William F. Hughes

cc: All Counsel (via LNFS)

EXHIBIT 9

Wallace
King
Domike
Branson

WALLACE KING DOMIKE & BRANSON, PLLC
1050 THOMAS JEFFERSON STREET, N.W.
WASHINGTON, DC 20007

Phone 202.204.1000
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PETER C. CONDRON
Direct Dial 202.204.3707
pcondron@wallaceking.com

October 17, 2005

VIA LEXIS/NEXIS FILE AND SERVE

Robin L. Greenwald, Esq.
Weitz & Luxenburg, P.C.
180 Maiden Lane, 17th Floor
New York, New York 10038-4925

Re: ***In re: MDL 1358 Products Liability Litigation***

Dear Ms. Greenwald:

On behalf of the Shell Defendants, this letter provides information responsive to Judge Scheindlin's August 12, 2005 directive regarding disclosure of participation in national and regional petroleum industry trade associations that focus on issues related to oxygenates and/or underground storage tanks ("USTs"). Based upon their investigation thus far, the Shell Defendants submit the following membership information:

American Petroleum Institute (API)

Shell Oil Company has been a member of API from 1950 though the present. During this period, representatives of Shell Oil Company and/or its various affiliates and subsidiaries may have participated in the following subcommittees and task forces: the 211(b) Research Group, the Ad Hoc Committee on MTBE, the Ad Hoc MTBE Coordination Group, the Fuels Committee, the Fuels Group Program, the Fuels Task Force, and the Soil/Groundwater Technical Task Force.

Louisiana Mid-Continent Oil & Gas Association (LMOGA)

Shell Oil Company and members of its various affiliates and subsidiaries, including Equiva Enterprises, Motiva Enterprises and Shell Oil Products US f/k/a Equilon Enterprises, have been members of LMOGA since at least 1980. During this period, representatives of Shell Oil Company and/or its various affiliates and subsidiaries may have participated in the Subcommittee on Air that was originally formed to consider the Clean Air Act Amendments of 1990.

Mid-Continent Oil and Gas Association

Shell Oil Company and/or its various affiliates and subsidiaries are current members of the Mid-Continent Oil and Gas Association.

National Petrochemical and Refiners Association (NPRA)

Shell Oil Company has been a member of NPRA from 1999 through the present.

National Petroleum Council (NPC)

Shell Oil Company and/or its various affiliates and subsidiaries have been members of NPC since 1946.

Petroleum Environmental Research Forum (PERF)

Shell Oil Company and/or its various affiliates and subsidiaries are current members of PERF.

Petroleum Marketers Association of America (PMAA)

Shell Oil Company has never been a member of PMAA. Shell Oil Company does support PMAA, though, through a corporate sponsorship.

Reformulated Gasoline Survey Association

Shell Oil Company and/or its various affiliates and subsidiaries are current members of the Reformulated Gasoline Survey Association.

Society of Independent Gasoline Marketers of America (SIGMA)

Shell Oil Company and/or its various affiliates and subsidiaries have been members of SIGMA since 1992 through the present.

Western Petroleum Marketers Association (WPMA)

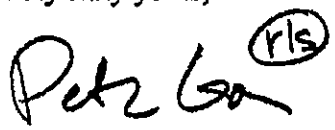
Shell Oil Company and/or its various affiliates and subsidiaries, excluding Motiva Enterprises and Equiva Enterprises, are current members of WPMA.

Western States Petroleum Association (WSPA)

Shell Oil Company has been a member of WSPA since a date prior to the relevant time period. During this time, representatives of Shell Oil Company and/or its various affiliates and subsidiaries may have participated in the MTBE Task Force subcommittee.

The Shell defendants have provided this information, including dates of membership, to the best of their knowledge. The Shell defendants are continuing their investigation and reserve the right to supplement this response should they discover additional information.

Very truly yours,



Peter C. Condron

cc: Counsel of Record (via LexisNexis File and Serve)

EXHIBIT 10

BRACEWELL & GIULIANI LLP

Tracie J. Renfroe
Partner

711 Louisiana Street, Suite 2300
Houston, Texas 77002-2770
Office 713.221.1404 800.887.1993
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tracie.renfroe@bracewellgiuliani.com

September 15, 2005

Via LexisNexis File & Serve

Robin L. Greenwald
Weitz & Luxenberg
180 Maiden Lane, 17th Floor
New York, New York 10038

Re: MDL 1358 – Valero and Ultramar Defendants' Trade Organization Information

Dear Ms. Greenwald:

In accordance with the Court's directive at the August 12, 2005 Status Conference and in your capacity as Plaintiffs' liaison counsel, this letter provides information on Valero Energy Corporation, Valero Marketing and Supply Company, Valero Refining and Marketing Company, and Valero Refining Company-California's[1] ("Valero Defendants") and Ultramar Inc., Ultramar Energy, Inc., Ultramar Limited, TPI Petroleum, Inc., and Colorado Refining Company's ("Ultramar Defendants") membership in the American Petroleum Institute ("API"), Oxygenated Fuels Association ("OFA"), and OFA MTBE Committee.

API

Valero Defendants have never been members of API. API records indicate that Hill Petroleum Company was a member of API from 1980-81, prior to this entity's affiliation with Valero Defendants beginning in 1997. Additionally, API records indicate that Ultramar Refining was a member of API from 1989-90; Ultramar Inc. was a member of API in 1991; and Ultramar Corporation was a member of API from 1992-93.

[1] Plaintiffs' complaints filed in Connecticut, Iowa, and New York also name Valero Refining Company, a non-existent entity.

BRACEWELL & GIULIANI LLP

OFA

Valero Energy Corporation was a member of OFA from 1993 until the organization's dissolution in 2004. Phibro Energy was apparently a member of OFA from 1994-95, prior to this entity's affiliation with the Valero Defendants in 1997. Ultramar Defendants have never been members of OFA.

MTBE Committee

Valero Defendants and Ultramar Defendants have never been members of the MTBE Committee.

Valero Defendants and Ultramar Defendants reserve the right to amend or supplement this information in the future if necessary.

Very truly yours,

Bracewell & Giuliani LLP

Tracie J. Renfroe

TJR/tds

cc: All counsel via LexisNexis File & Serve

EXHIBIT 11

→ Set.
XMAT— 9

American Petroleum Institute
1220 L Street, Northwest
Washington, D C 20005
202-682-8000

S.T. Cragg, Ph.D.
Toxicologist
202/682-8342

TO: Methyl tertiary-Butyl Ether Task Force

FROM: Steven T. Cragg STC

DATE: June 18, 1984

Enclosed are the minutes of the MtBE meeting. If there are items which are of sufficient importance to be added or changed, please send your marked copy to K.A. Hazer, Ph.D. in Chuck's absence. As you know, I will not be available after this date as well.

xc: K.A. Hazer (API)
C.E. Holdsworth (API)
E.O. Siebert (Huels)
N.K. Weaver (API)

THE AMERICAN PETROLEUM INSTITUTE

Medicine and Biological Science Department

Methyl tertiary-Butyl Ether Meeting

API Offices
Washington, D.C.

Tuesday, June 12, 1984
9:30 a.m.

Participants:

R.C. Anderson (API)
C.C. Conaway (Texaco)
S.T. Cragg (API)
B.K. Hoover (ARCO Chem.)
C.J. Kirwin (Phillips)
S.C. Lovre (ARCO Pet.)
S.A. Ridlon (ARCO Chem.)
E.O. Seibert (Huels)
F.B. Thomas (Shell)

The purpose of the meeting was to discuss the status of the composite final report of the toxicity and metabolism studies conducted on MtBE by Bio/dynamics Laboratory, Inc. In addition, the disposition of any future studies was also evaluated, as was the emerging issue of MtBE in ground water. Also considered were such items as; publication of results, longterm storage of study data and materials, final audit of study results, and ACGIH deliberations on an MtBE TLV.

Regarding the composite report, task force comments for the initial draft have been submitted and revisions by the laboratory have been made. The task force still had some minor concerns which it desired changed and decided to extend the deadline for further comment until July 1, 1984. It was realized that the contract laboratory is under no obligation to make further revisions. The changes will be asked for, however. Following this, the decision was reached to accept the report with the additional task force comments. The task force may decide at a later date to have the summarized comments accompany the report or be incorporated into the MtBE file, if Bio/dynamics does not further revise the report.

Several other decisions were reached concerning the Bio/dynamics studies. First, Bio/dynamics will be instructed to discard the

radiolabeled tissues from the metabolism study as the metabolites within them may have volatilized/sublimed over time to the point that if they were now analyzed, misleading values might be generated. Second, the remaining tissues and data will be sent to the API repository for those studies specifying short storage intervals in the contract. Third, a follow-up quality assurance audit was recommended by the task force to be performed on the reproduction/teratology study. The task force realized, however, that API staff was presently understaffed and left the decision of prioritization of this effort to staff.

Dr. Conaway recommended that, if possible, at least three papers be published from the Bio/dynamics MtBE studies. These would include publications on; 1) two-species teratology, 2) reproduction, and 3) metabolism. Concern was expressed that the metabolism data may not be sufficient for publication. Various names were recommended as authors for these papers. Dr. Von Bulow will be encouraged to submit a paper on the Huels sponsored 90-day study and ARCO may submit its genetox data. An attempt will be made to submit all of these as a package to a single journal such as the Journal of Environmental Contamination and Toxicology. Dr. Conaway asked that all draft papers be submitted to API no later than September 1, 1984. API will act as the "clearing-house" for the papers and will submit the packet to the journal.

In view of the NTP's deprioritization for conducting a carcinogenicity bioassay on tertiary-butyl alcohol (TBA), a known metabolite of MtBE, the task force decided little need existed for additional metabolism studies at this time.

Some of the task force members indicated that MtBE had been found in ground water near leaking underground storage tanks from their service stations. Usually the service stations having these problems have not been directly owned by the company, but are franchise stations with older storage tanks. It appears that the oxygenate components of gasoline, such as MtBE, migrate most rapidly underground and are the most noticable from an organoleptic standpoint. Pending votes from Exxon, Tenneco and Dr. Von Bulow of Huels, the task force decided to give the remaining funds in the MtBE budget to the API research effort on gasoline in groundwater. This is contingent upon API's testing of oxygenates (and MtBE in particular) in such a program. However, if such an API research effort does not include the testing of oxygenates/MtBE, the remaining funds of $28,000 will be returned to the companies participating in the MtBE testing program.

Regarding a similar issue, the proposal by Dr. Finn on groundwater contamination will be referred back to Dr. David Chen (API staff to the Environmental Biology and Community Health Committee) for review by this committee.

Finally, as a point of information, Ms. Hoover reported that all

data in API files concerning MtBE had been forwarded to J. Gesser representing the ACGIH. This organization will propose a TLV for MtBE in the near future. It was speculated that such a level might be similar to other ethers (i.e., 400 ppm).

prepared by;

STC

Steven T. Cragg, Ph.D.
API Toxicologist
6/15/84

EXHIBIT 12

MAT-9

ARCO Chemical Company — Internal Correspondence

Date: June 14, 1984

Subject: API MTBE Meeting Highlights

From/Location: B. K. Hoover

To/Location: S. A. Ridlon

A meeting of the API Ad Hoc Committee on MTBE was held in Washington on June 12, 1984. Those in attendance included: F. B. Thomas (Shell), C. C. Conaway (Texaco), S. T. Cragg (API), E. Seibert (Huls), C. Kirwin (Phillips), R. C. Anderson (API), S. C. Lovre (ARCO), S. A. Ridlon (ARCO Chemical), and B. K. Hoover (ARCO Chemical).

The status of the composite final report of the API studies was discussed. Although the report was generally good, some committee members had minor comments that they would like to have the laboratory address. It was decided that these remaining comments would be sent to API staff for submission to the laboratory. The report was given provisional approval providing that the laboratory address these comments either by letter or by changes in the report.

Dr. Conaway expressed a desire to submit these studies for publication to the Journal of Environmental Health and Toxicology. Authorship on the various papers was determined. Dr. Conaway stated that he had asked Larry Andrews of ARCO to review the metabolism study and prepare a draft for publication. ARCO is currently reviewing this request since problems noted in that study may make it less suitable for publication. Dr. Conaway also asked Dr. Ridlon of ARCO to review the possibility of publishing the acute studies that it submitted to the committee as background for the API work.

The future plans of the group were considered. It was decided that no attempt would be made to pursue plans to perform any new metabolism study. The cost of future work as well and the qualitative data obtained in the earlier metabolic study were cited as reasons for this decision.

MTBE is a possible contaminant of groundwater, especially in association with leaking gasoline storage tanks. Dr. Conaway expressed a desire to obtain taste and odor threshold data for MTBE. Dr. Thomas explained that he is chairman of the API task force on groundwater contamination. Their plans are presently only tentative due to a need for greater direction from API management committees. He stated that oxygenates such as MTBE were considered proprietary and not sufficiently generic to the industry to be considered in an API project at the present time. He further indicated that the Environmental Biology and Community

Health Committee of API is considering taste and odor problems associated with the soluble components of gasoline. They may be willing to consider MTBE, as well as other oxygenates, on their list of contaminates for study. The Ad Hoc Committee decided to make their remaining funds available to that group providing that they specifically study MTBE and that they are allowed to review and comment on the proposal prior to the initiation of work. If this is not possible, they instructed API to distribute the remainder of the money back to each member company serving on the MTBE committee.

On other matters, the committee decided to dispose of the radio-labelled tissues from the metabolism study pending appropriate file documentation. They decided to ask API to make arrangements to store data and specimens from all MTBE studies at Experimental Pathology Laboratories in Herndon, Virginia. A request was made to API to revisit Bio/dynamics to quality assure the portions of the studies that were rejected during previous audits. If API needs assistance in this area, ARCO agreed to send B. K. Hoover to aid in this effort. ARCO staff reported on the latest information on a possible TLV for MTBE which is being considered by ACGIH. A draft document has been prepared along with a recommended TLV for consideration by the full committee of ACGIH at their next meeting. This TLV is expected to be in the range of 300-500 ppm which is consistent with other ethers and above current workplace exposures.

It was decided that it would not be necessary for the Ad Hoc Committee to meet again since it had completed its mission. The meeting was adjourned at noon.

BKH:mrr

[API/MTBE/MTG]

EXHIBIT 13

Hydrocarbons and Organic Chemicals in Ground Water—Prevention, Detection and Restoration

November 12-14, 1986
The Westin Galleria, Houston, Texas

Sponsors

National Water Well Association
American Petroleum Institute

Published by

National Water Well Association
6375 Riverside Dr.
Dublin, Ohio 43017

Produced by

Water Well Journal Publishing Co.
6375 Riverside Dr.
Dublin, Ohio 43017

Abstract

The NWWA/API Conference and Exposition on Petroleum Hydrocarbons and Organic Chemicals in Ground Water—Prevention, Detection and Restoration, was held in Houston, Texas, on November 12-14, 1986. The conference covered a wide range of topics including prevention of ground water contamination from underground storage tanks, migration of petroleum hydrocarbons and organic chemicals in ground water, characterizing contaminant transport in the vadose zone, physical and chemical processes in the subsurface, utilizing remote sensing for detecting and delineating subsurface contamination, monitoring and analytical techniques for contaminant identification, characterizing subsurface geology and mapping contaminant movement, detection of volatile organic chemicals in ground water, remedial action planning and risk assessment, innovative applications of new and established technologies for remedial action and case histories. Government officials, consulting geologists and engineers, researchers, industry representatives and other interested persons met to learn and discuss state-of-the-art techniques employed in preventing, detecting and restoring ground water contamination resulting from petroleum hydrocarbons and organic chemicals. Additionally, the lastest in state-of-the-art instrumentation and equipment was discussed and displayed. The conference provided a forum for all who attended to communicate and share their experiences in this rapidly developing field.

These proceedings are a compilation of papers presented by the symposium speakers.

Disclaimer

The papers appearing in this set of proceedings of the conference previously described have been reproduced exactly as submitted by the authors without technical and grammatical editing or peer review. It is the belief of the conference coordinating committee that these papers have technical merit or they would not have been selected for presentation. Complete accuracy or technical viability cannot, however, be assured. It is believed, nevertheless, that early publication and rapid dissemination outweighs any possible reduction in quality that may be encountered.

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TD426.N88 1986 363.7394 87-1623

Table of Contents

B. Characterizing Contaminant Transport in the Vadose Zone

C. Physical and Chemical Processes in the Subsurface

Session III
Detection

A. Utilizing Remote Sensing for Detecting and Delineating Subsurface Contamination

MTBE as a Ground Water Contaminant

by
Peter Garrett, Marcel Moreau
Maine Department of Environmental Protection
Augusta, ME 04333
and
Jerry D.Lowry
University of Maine, Orono, ME 04473

Abstract

MTBE (Methyl tertiary Butyl Ether) is now among the top fifty chemicals produced in the United States. It is used exclusively as an octane enhancer in gasoline, in which it constitutes up to 11 percent of total volume .

MTBE is soluble in water at 4.3%. This compares with the relative insolubility of benzene (0.18%), toluene (0.05%), and xylene (0.02%). However, the BTX compounds are more soluble in MTBE than they are in water. When gasoline plus MTBE leaks to ground water, the MTBE spreads both further and faster than the gasoline, and the concentration of gasoline dissolved in ground water increases.

We have investigated several cases of ground water contamination resulting from spills of gasoline with MTBE. In one such case, several household wells became contaminated with MTBE only. In one household, concentrations of up to 690 ppb MTBE were measured, (with other gasoline constituents combined at less than 10ppb). The well nearest the spill had concentrations of up to 126,000 ppb gasoline including MTBE. At another site, concentrations exceeded 600,000 ppb gasoline including MTBE. This contrasts with the usual maximum dissolved concentration of gasoline in ground water near spill sites of about 10-30,000ppb (when no MTBE is present).

Toxicity data on MTBE indicate that it is an irritant like many of the other components of gasoline. Maine has set a maximum contaminant level of 50ppb.

Ground water contaminated with MTBE is difficult to remediate. Filtration through activated carbon is not cost effective for MTBE: a 2 cubic foot bed lasts a month or less as a household treatment system, even with an influent concentration of MTBE as low as a few parts per billion. However, air stripping systems are capable of removing MTBE, but only if very high air to water ratios are used.

Introduction

With the reduction in lead content of gasolines, octane enhancement is now achieved by several compounds, including ethanol, methanol, tertiary-butyl alcohol (TBA), Oxinol™ (a blend of methanol and TBA), "reformate", "alkylate", or extra doses of toluene and xylene. But the additive which is increasingly popular at the refineries where gasoline is blended is MTBE (methyl tertiary-butyl ether, also known as TBME, or sometimes as 2-methoxy 2-methyl propane), the subject of this paper.

Facts about MTBE

MTBE is an "oxygenate" and one of the few compunds in gasoline to contain oxygen. Its structure is given in Fig. 1.

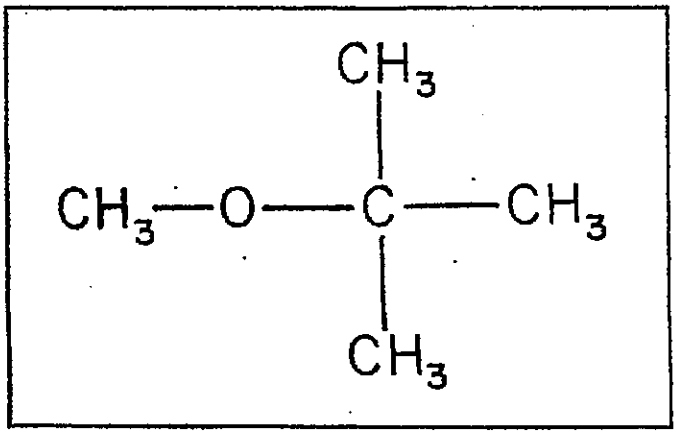


Fig. 1. Chemical structure of MTBE. The horizontal CH_3-O-C bonding represents the ether molecule, while the vertical CH_3-C-CH_3 unit represents a propane molecule.

MTBE is now among the top 50 chemicals produced in the United States (47th by weight in 1984, 44th in 1985: Chemical and Engineering News, June 1985 and 1986). ARCO and Texas Petrochemicals are the major producers of MTBE, most of which is made for sale to other refineries where it is blended into gasoline. 30 plants now produce MTBE throughout the world, with an additional 20 planned. Total U.S. production is now running over 80,000 barrels per day (Octane Week, Feb. 2, 1987). Currently, 95% of that total is produced in Texas, from where it is shipped, either pure or blended in gasoline, to other parts of the US east of the Rockies. At present, little is used in western States, in Canada, or in Europe. However, MTBE use in the west and in other countries is expected to increase with increasing emphasis on lead phasedown.

MTBE was first produced by ARCO in the 1960s, when they patented a process for removing branched olefins such as isobutylene from hydrocarbon streams. MTBE is manufactured by reacting this isobutylene with a small amount of methanol. It was not until 1979, however, that MTBE was first produced commercially. Since 1980, production has increased at a rate of about 40% per year. It is currently used in about 10% of the nation's gasoline, though the proportion of gasolines with MTBE may be much higher in some parts of the US. (From ARCO advertising materials and personal communications.)

EPA allows the blending of MTBE into gasoline up to about 11% by volume. The exact proportions of MTBE in a particular gasoline depend on the composition of the crude, the octane rating of the distillate, and the required octane rating of the final blend. MTBE is usually blended at between 2 and 7%. MTBE is used in both unleaded and "regular" gasolines. Usually the highest proportions are to be found in unleaded premium. (ARCO, personal communication.)

Among other claims made about MTBE are: 1) that it has a blending octane value greater than that of toluene, reformate or alkylate; 2) that it is compatible with all types of automotive and tank liner materials; 3) that it does not have a phase separation problem in the presence of water (which is a problem with ethanol and methanol); and 4) that its use in gasoline reduces carbon monoxide and hydrocarbon emissions in most cars (from ARCO's advertising pamphlets).

Transport and Fate of MTBE in the Environment

MTBE is soluble in water at 4.3% (ARCO data). This compares to the relative insolubility of other major components of gasoline, as summarized in Table 1.

Table 1: Solubility of some major gasoline components

	binary equilibrium solubility in water at 25°C		
	mg/l	%	relative to benzene
benzene	1,780	0.18	1
toluene	515	0.05	0.3
m-xylene	170	0.02	0.1
MTBE	43,000	4.3	24

(Data from API, 1985, Table 2-1 for BTX. That source gives a range of values for each component. Data for MTBE from ARCO factsheets.)

Though it is important to realize that the equilibrium solubilities listed above are rarely reached in nature, the significance of the figures lies in their ability to predict how MTBE behaves as a ground water contaminant relative to other components of gasoline, of which benzene is the most soluble (API 1985, table 2-2).

MTBE is only used as an additive of gasoline. Thus one can assume that, except perhaps around refineries, the presence of MTBE in ground water signifies the nearby presence of gasoline.

When gasoline leaks to ground water, it contaminates the unsaturated zone and the water table with free product in the vicinity of the leak. Recharge to ground water by precipitation percolates through this product contamination zone, dissolving components of gasoline in approximate proportion to their solubilities. Although we know of no laboratory data, we infer that the concentration of MTBE in the recharge water will be considerably enhanced over that of the other components of gasoline for the following two reasons:

First, MTBE is at least an order of magnitude more soluble than other components of gasoline. Second, at a concentration of up to 11% of the pure product, MTBE may be one of the largest components of the spilled gasoline.

Once in the zone of saturation, the dissolved components travel with ground water. Concentrations of contaminants diminish as distance from the spill increases because of dilution, sorption onto soil particles, and biodegradation (Barker, Patrick and Major, 1987). In general, sorption of organic compounds is inversely proportional to their solubility (API 1985, p.4), so we expect MTBE to have a low sorption onto soil particles.

From the above, we infer that a plume of MTBE in ground water should be more extensive than the plume of other gasoline components. There should be areas on the outer fringes of the total plume where MTBE is the only detectable contaminant. The MTBE plume will appear as a "halo" around the dissolved gasoline plume, which in turn appears as a halo around the free product plume.

The greater solubility of MTBE in water, combined with the near 100% solubility of all gasoline components in MTBE may increase the sum total of all dissolved gasoline components in ground water. If this is so, then spills which contain MTBE should result in higher concentrations of total dissolved hydrocarbons in ground water than spills with no MTBE. This would be a co-solvent effect in the sense of Munz and Roberts (1986).

With respect to the biodegradability of MTBE, Fujiwara and others (1984) found that the presence of MTBE had little effect on the biodegradability of blended gasoline. But they did not discuss the biodegradability of MTBE alone.

Identification and Quantification of MTBE in Ground Water

The first indication of the presence of MTBE in domestic water supplies comes from its odor. It is said to have a "terpene-like" odor (ARCO personal communication), but householders more often describe it simply as a "chemical" odor. Our first contamination case, in 1984, was initially mistaken for one of hazardous waste leachate because of the unusual smell. From a large number of cases of contaminated domestic wells we have found that people can detect the odor of MTBE in their water at concentrations as low as 20-50 parts per billion.

In the lab, the identification of MTBE is difficult when it is associated with the other components of gasoline (e.g. Fig. 2a), but is simple when it occurs as a single component in water (Fig. 2b). At the Public Health and Department of Environmental Protection Laboratories in Maine, gasoline is analyzed in water using head space gas chromatography (GC). Fig. 2a shows the kind of scan which that method produces. Each constituent of the mixture shows itself as one or a series of peaks, but the peaks themselves do not provide unique identification because their exact position on the scan can vary depending on chromatographic conditions.

Because gasoline is initially a variable mixture, with each component having its own unique solubility and sorptive properties, every different spill has a different GC trace. We have found, however, that MTBE separates out as a distinct peak between the usually prominent peaks of iso-pentane and 2-methyl-pentane. The exact time of its emergence on the GC scan is dependant on column length, whether packed or capillary columns are used, and the specific temperature program of the run.

(Note that this is not a standard EPA method, though it is most akin to Method 601. Our State labs in Maine do not separately identify benzene, toluene, xylene and ethylbenzene as the indicators of gasoline contamination, because we believe that the many other components should not be ignored. If your laboratory chemists only identify the BTX components, then they should obtain an MTBE standard and separately identify it along with BTX. If your lab follows a total hydrocarbon analytical method, like Maine's, it is still useful to get the lab to separately identify and quantify MTBE. This is because gasoline with MTBE behaves differently in ground water than gasoline alone. For further details on labratory procedure, contact the Jack Krueger at the Public Health Lab, State House Station # 11, Augusta, ME 04333, (207) 289-2727.)

We have so far identified about 30 other sites in Maine where MTBE is a component of the spilled gasoline. This accounts for about 90% of the recent analyses which we have routed through the Public Health Lab. They all seem to follow the same general pattern that:

1) concentrations of gasoline and MTBE in ground water at the center of the plume can be extrememely high. Our record high concentration so far is over 600,000 parts per billion in one household well with the intake pipe beneath floating product in a sand and gravel aquifer. This contrasts with the usual maximum concentration for similar situations without MTBE of about 10-30,000 parts per billion.

2) MTBE can occur as the only contaminant above detection limit over large areas of the plume. In one plume, believed to have originated from a small driveway spill, MTBE was the only detected contaminant of the spill.

3) the MTBE plume seems to occur as a halo around the gasoline-plus-MTBE plume. Where the plume is expanding, detection of MTBE precedes detection of gasoline in contaminated wells.

Toxicity of MTBE

The American Petroleum Institute, and several MTBE producers have run a battery of toxicity tests to assess its hazards. A summary of the results of these tests is as follows:

Within the limits of the testing, MTBE was found to be not very toxic, with effects similar to those which are characteristic of other ether compounds such as diethyl ether, formerly the standard surgical anaesthetic. It appears not to be genotoxic, and because it was "negative with and without activation" on the Ames test, it is probaby not carcinogenic. MTBE is, however, a skin and eye irritant in more than one rodent species at high doses.

ARCO's health monitoring of their workers at MTBE manufacturing and transport facilities seem to indicate no adverse effects at time weighted average doses of up to 3ppm in air. But as is commonplace with any ground water contaminant getting into household water supplies, the concern it raises and the aggravation it causes the affected householders is a serious health effect independant of its toxicity.

Four reasons for concern over the toxicity of MTBE, and its presence in domestic well water are the following:

1) It is very mobile in ground water. Thus concentrations recorded from a well one week may be quite different the following week. Occassionally we have noted increases in the concentration of MTBE in domestic supplies of about an order of magnitude within a couple of days. Thus it is important to reduce concentrations in domestic water supplies as soon as they are discovered.

2) Plumes of MTBE in ground water are associated with plumes of gasoline, with its more varied and toxic components. Thus detection of MTBE should be considered a warning bell.

3) There is concern over MTBE's irritant properties.

4) MTBE is probably a nervous system depressant (like other ethers and the BTX components of gasoline) at high concentrations .

With these considerations in mind, the State Toxicologist for Maine has set a recommended maximum concentration level for MTBE in domestic water at 50 parts per billion, the same as for gasoline.

Removal of MTBE from Household Ground Water Supplies

Treating ground water supplies contaminated with MTBE is considerably more difficult than when gasoline alone is present.

Typically, granular activated carbon (GAC) is used as an interim measure to remove gasoline contamination from household ground water supplies (Hall and Mumford, 1987). But MTBE, with its relatively high solubility, is poorly adsorbed by GAC: thus breakthrough of MTBE comes early. Laboratory (API, 1983; and Lowry, unpublished experiments) and field (DEP experience) data substantiate this point. In general the bedlife of GAC units is less than 25% of what it would be if no MTBE were present. Or, in practical terms, a typical 2 cubic foot GAC unit will last only a few weeks or months when MTBE is present (the length of time being dependant on concentrations of contaminants, rate of water use, and the brand and type of GAC employed). Because the cost of GAC treatment is primarily in the replacement of the carbon bed, this makes GAC uneconomic when MTBE is present above a few tens of parts per billion.

Aeration is an alternative method of treatment for the removal of MTBE from water supplies. Aeration does not have the problem of saturation of an adsorptive medium. But unfortunately, the relatively low volatility of MTBE makes it difficult to remove compared to the other components of gasoline. Here the Henry's Law Constant is the controlling variable: for MTBE it is estimated to be less than 0.05, whereas it is 0.20 and 0.23 for benzene and toluene respectively. However, the efficacy of aeration can be increased by lengthening the aeration time or increasing the air to water ratio.

Lowry Engineering has developed a unique batch aeration system with variable aeration time, which has treated individual domestic water supplies contaminated with more than 200,000 parts per billion total gasoline and MTBE, with the treated water having no detectable hydrocarbons. Several units are now being monitored in the field where they have been performing satisfactorily. We have found that the system is the most effective and secure against breakthrough when contamination of ground water exceeds a few parts per million total gasoline or fuel oil, or more than 50 ppb MTBE.

For further information on treatment see Lowry and Lowry (1985).

Conclusions

1) MTBE is a more soluble and more rapidly spreading ground water contaminant than other components of gasoline,

2) Its presence in spilled gasoline increases dissolved concentrations of gasoline in ground water in the immediate vicinity of the spill to about an order of magnitude above typical values for spills in which there is no MTBE, and

3) It is more difficult to remove from contaminated water than the other components of gasoline.

Discussion of Policy Options

As this work grew out of a regulatory background founded on the need to limit the damage caused by leaking underground storage tanks, it is natural for us to think in terms of what these findings should mean in terms of new policy decisions. The following are a sample. There may be other options, and we are not advocating one option over another. The object of this discussion is to stimulate the reader into thinking of what should be done.

Option 1: MTBE could be abandoned as an additive in gasoline stored underground. Replacement of MTBE by ethanol, methanol or TBA is not, however, likely to improve the

situation vis a vis ground water. All are more soluble than MTBE, and TBA is almost impossible to remove by carbon adsorption or air stripping (API, 1983).

But octane enhancement without additives is possible (DoE, 1985). It is achieved by "reforming" some of the components of the distillate during the refining process so that the refined gasoline already has sufficient octane. Some producers prefer this "reformate" method of obtaining the required octane, and it does not have the environmental disadvantages of MTBE or its alcoholic competitors.

Option 2: Because the increased mobility of plumes containing MTBE results in greatly increased volumes of contaminated ground water, gasolines in which MTBE is blended could perhaps be stored only in double-contained facilities, or those with sensitive and effective leak detection systems. (This policy option may also have to be applied to gasolines blended with any highly soluble additive.)

Option 3: Because of the rise in popularity of MTBE and other very soluble additives to replace lead as the octane enhancer, it is perhaps time to acknowledge that all underground storage must be as secure as possible.

One Final Point. The Human Side of MTBE Contamination.

Several colleagues have commented that MTBE may be useful as a contaminant tracer because it is apparently less toxic, and precedes and travels further than the BTX components. We beg to differ. That opinion forgets the human element of gasoline spills.

The North Berwick spill contaminated the wells of two homes to concentrations an order of magnitude higher than if there had been no MTBE. The young couple in one of those homes had to wait for us to invent a whole new method of water treatment for their housefold supply. The young family in the other decided that water treatment was not the way to go, and chose instead to truck in water, at considerable expense and nuisance. The fact that MTBE appears to be less toxic than benzene was no consolation to the parents of young children. The anguish these two families underwent cannot be put into words.

The six other homes in North Berwick with only MTBE in their water were worried about when they would get gasoline too. The trauma associated with the contamination of a home water supply is not proportional to the toxicity of the contaminant detected.

References

American Petroleum Institute, 1983, Treatment Technology for Removal of Dissolved Gasoline Components from Ground Water: API Publ. 4369, 34p and appendices.

American Petroleum Institute, 1985, Literature Survey: Hydrocarbon Solubilities and Attenuation Mechanisms: API Publ. 4414, 101p.

Barker, J.F., G.C.Patrick, and D.Major, 1987, Natural Attenuation of Aromatic Hydrocarbons in a Shallow Sand Aquifer: **Ground Water Monitoring Review**, v.7, pp. 64-71.

Department of Energy, 1985, Gasoline Octane Enhancement: Technology, Economics, and Environmental, Health and Safety Considerations: DOE/PE/72013-1.

Fujiwara, Y., T.Kinoshita, H.Sato, and I.Kojima, 1984, Biodegradation and Bioconcentration of Alkyl Ethers: **Yukagatu**, v. 33, pp.111-114.

Hall, D.W., and Mumford, R.L., 1987, Interim Private Water Well Remediation using Carbon Adsorption: **Ground Water Monitoring Review**, v.7, pp.77-83.

Lowry, J.D., and S.Lowry, 1985, Restoration of gasoline-contaminated household water supplies: Proc. 2nd Annual Eastern Regional Ground Water Conference, National Water Well Association, pp 506-521.

EXHIBIT 14

VALERO CORPORATE REPRESENTATIVE DEPOSITION
EARLY KNOWLEDGE AND TASTE & ODOR

Norman Renfro
Vice President of Health, Safety and Environmental
Valero Services, Inc.

Employment History

May 7, 1984	Environmental Engineer
1988	Chief Environmental Engineer
1992	Environmental Manager
1995	Director of Safety and Environmental
1997	Vice President of Environmental and Safety Affairs
2002	Vice President of Health, Safety and Environmental

For purposes of this deposition, "Valero" includes the following entities:

Valero Energy Corporation
Valero Marketing and Supply Company
Valero Refining Company
Valero Refining and Marketing Company
Valero Refining Company Louisiana
Valero Refining—Texas, L.P.
Valero Refining Company—New Jersey
Valero Refining Company—California

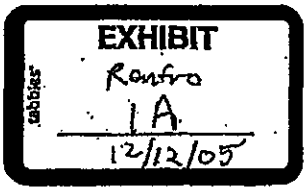
Norman Renfro testimony applicable to heritage Valero and Basis refineries (1997), Paulsboro (1998), and Benicia (May 2000).

1. Whether any DOCUMENTS described in the Request to Produce Documents, which is a part of this notice, were destroyed. If so, when were said documents destroyed and by whom?

   Valero is not aware of any instance in which responsive documents were destroyed. Given the expansive time frame for which the request seeks documents, it is possible that potentially responsive documents were destroyed long before this litigation was initiated.

2. Authentication of all DOCUMENTS produced at the deposition.

3. What efforts were made to locate the DOCUMENTS described in the request to produce documents that accompanies this deposition notice, who performed the search, and when and what was found.



Valero's archive documents were searched and reviewed for purposes of production in previous MTBE litigation matters (MDL I) as well as this litigation (MDL 1358), and for purposes of this subpoena. The files of individual employees thought likely to have relevant information have been collected and reviewed for responsiveness, as have potentially responsive files located at relevant refineries. Documents that were located and determined to be responsive to this subpoena have been produced to Plaintiffs.

The following people were interviewed for preparation for this deposition:

Joe Almarez
Curt Benefield
John Braeutigam
Bobby Broadway
John Cotterel
Gene Edwards
Peter Fasullo
Tim George
Bill Glasscock
Jim Greenwood
Chip Gross
TD Higginbotham
Cal Hodge
Jon Kiggans
George Kain
Baines Manning
Gino Panganucci
Sam Pinizzotto
Roger Rinas
Rick Roat
Les Rucker
Wayne Smithers
Reid Trekell
Geoff Willig
Marty Zanotti

EARLY KNOWLEDGE ISSUES

3. The Defendant's early knowledge and understanding of MTBE and/or TBA's characteristics and impact on the environment.

(a) When Valero First Became Aware That MTBE Had Caused Water Contamination.

A few Valero employees became aware in approximately 1987 of allegations that MTBE had been detected in groundwater in Maine. The information received was

limited and indicated that the release was a unique situation and not likely to recur. Some Valero employees became aware that MTBE had been detected in groundwater in Denver in early-mid 1995. In general, Valero employees became aware of MTBE detections in the City of Santa Monica drinking water wells in connection with news accounts in 1995 or 1996.

(b) First Several Instances in Which Valero Dealt With MTBE Contamination At Refineries

In September 1998, Valero acquired the Paulsboro refinery from Mobil. Since approximately 1979, the refinery has been operating a system designed to contain hydrocarbon contamination underneath the refinery. MTBE was detected in some wells at the refinery in 1997, prior to Valero's acquisition. The operation of the system, however, has not been modified as result of the MTBE detection in 1997.

In May 2000, Valero acquired the Benicia refinery from ExxonMobil. Prior to Valero's acquisition, MTBE had been detected at the refinery and terminal. ExxonMobil retains liability for this contamination. Since mid-2000, however, Valero has operated and maintained the equipment, including quarterly sampling.

In 2001, Valero detected MTBE in groundwater wells at the Corpus Christi refinery. The Remedial Action Plan (pump and treat 7 wells) does not call for any specific/different treatment in light of the existence of MTBE. The refinery continues to monitor the wells semi-annually for MTBE and BTEX.

In 2002, MTBE was detected in groundwater at the Houston refinery. The existing system has not been modified as a result of the MTBE detection.

(c) First Instances in Which Valero Dealt With MTBE Contamination at Retail Stations

In 2000, in connection with Valero's purchase of retail stations in California from ExxonMobil, Valero commissioned environmental assessments of 16 retail stations. MTBE contamination was discovered at 12 of these stations. ExxonMobil retained the responsibility for remediating contamination at the sites. Therefore, Valero did not "deal with" MTBE contamination at these sites.

In 2002, in connection with its merger with Ultramar Diamond Shamrock Corporation, Valero entities acquired 1421 retail stations. Valero acquired approximately 840 sites at which there were on-going remediation activities, some of which included remediation of MTBE. A detailed review of all of the remediation site files has not been performed for this deposition.

(d) First Several Instances in Which Valero Was Provided Information From Others in the Industry About Their Early Experiences With MTBE.

Valero has not located any specific record indicating that it received information from another in the industry about their early experience with MTBE. Valero

acquired information about Mobil's experience with MTBE at the Paulsboro refinery in 1998, and about ExxonMobil's experience with MTBE at the Benicia refinery in 2000. Valero became aware of Ultramar Diamond Shamrock's experiences with remediation of MTBE after its merger with Ultramar Diamond Shamrock on December 31, 2001.

(e) When Valero First Became Aware of MTBE's Low Taste and Odor Threshold.

Valero does not contend that MTBE has a "low" taste and odor threshold. Valero understands that the concentrations in water at which MTBE can be detected by taste or odor varies widely. In 1995, Valero learned from an OFA Fact Sheet that MTBE's average odor detection threshold in water has been measured in the range of 45-95 ppb and its average taste threshold at 134 ppb.

(f) When Valero First Became Aware of the Fact that MTBE Flows Further and Faster than BTEX, and is More Likely to Cause Contamination Than a Release of Conventional Gasoline.

Valero became aware of allegations that MTBE flows further and faster than BTEX in 1995. Valero has not concluded that MTBE is more likely to cause contamination than a release of conventional gasoline.

(g) When Valero First Became Aware of the Fact That MTBE is More Soluble in Water Than the BTEX Constituents.

As a chemical principle, Valero is aware that MTBE is more soluble in water than the BTEX constituents. Valero is also aware that MTBE is less soluble in water than some other constituents of gasoline.

(h) When Valero First Became Aware of MTBE's Resistance to Biodegradation, and the Fact That MTBE is More Difficult and Costly to Remediate.

Valero became aware of allegations that MTBE was resistant to biodegradation in 1995. Valero agrees that in some specific circumstances, MTBE may be more costly to remove from groundwater than BTEX constituents. Based on Valero's investigation, it appears that Valero first became aware of this in 1995.

TASTE AND ODOR DEPOSITION ISSUES

4. STUDIES done by you, done at your direction, or that you obtained or reviewed that are designed to determine the taste and odor threshold of MTBE and/or TBA in water.

Valero has not performed any such studies. With regard to studies conducted by others, Valero has obtained the following documents that may relate to this issue.

(a) U.S. Environmental Protection Agency, November 1993, Assessment of Potential Health Risks of Gasoline Oxygenated with Methyl Tertiary Butyl Ether (MTBE): Washington, D.C., Office of Research and Development;

(b) Oxygenated Fuels Association, 1995, MTBE in Ground Water--Fact Sheet for Local Health and Water Authorities: Oxygenated Fuels Association;

(c) U.S. Environmental Protection Agency, 1997, EPA Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Methyl Tertiary-Butyl Ether (MTBE) and related Fact Sheet;

5. When, and under what circumstances, according to YOUR records, YOU first learned about MTBE's taste and odor threshold in water, and how that knowledge evolved over time.

Valero first learned of the controversy regarding MTBE's taste and odor threshold in water in 1995. Valero has not formed an opinion as to MTBE's particular taste and odor threshold in water. In December 1997, the EPA set a Drinking Water Advisory for MTBE at 20 to 40 ppb.

6. When, according to YOUR records, YOU first received a copy of the January 17, 2003, Product Safety Bulletin for Methyl Tertiary Butyl Ether published by Lyondell Chemical Company.

Valero has no record of ever receiving a copy of the January 17, 2003, Product Safety Bulletin for Methyl Tertiary Butyl Ether published by Lyondell Chemical Company.

7. When, according to YOUR records, YOU first received a copy of the 18 March 1993 Campden Food and Drink Research Association STUDY titled Flavor [sic] and Odour [sic] Thresholds of Methyl Tertiary Butyl Ether (MTBE) in Water.

Valero has no record of ever receiving this document. Valero understands that it was produced to Ultramar Inc. in the South Lake Tahoe Litigation.

EXHIBIT 15

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SAN FRANCISCO

--o0o--

SOUTH TAHOE PUBLIC UTILITY DISTRICT,

Plaintiff,

vs

ATLANTIC RICHFIELD COMPANY ("ARCO"); ARCO CHEMICAL COMPANY; SHELL OIL COMPANY; CHEVRON U.S.A., INC.; EXXON CORPORATION; B.P. AMERICA, INC.; TOSCO CORPORATION; ULTRAMAR, INC.; BEACON OIL CO.; USA GASOLINE CORPORATION; SHELL OIL PRODUCTS CO.; TERRIBLE HERBST, INC.; ROTTEN ROBBIE; J.E. TVETEN CORP.; TAHOE TOM'S GAS STATION; THE SOUTHLAND CORP.; PARADISE CHEVRON; and DOES 1 through 600, inclusive,

Defendants.

No. 999128
THIS TRANSCRIPT CONTAINS CONFIDENTIAL MATERIALS

--o0o--

WEDNESDAY, JULY 26, 2000

10:07 A.M.

--o0o--

DEPOSITION OF

JOEL MASCITELLI

--o0o--

CATHLEEN SLOCUM, CSR
License No. 2822

product specifications for the company. So I'm sure that he may have had some responsibility at that time.
Q At the time you left the company, were these three gentlemen still employed by Ultramar?
10:33:00 am A Yes, they were.
Q As far as you know are they still employed by the company?
A I believe they, all three of them still are.
Q Prior to 1996, and let's take the 1990 through 1996 time period, was Ultramar a member of the American Petroleum Institute?
A We were a member, and I don't remember the exact year, up until sometime in -- it could have been, you
10:33:30 am know, right after the IPO which was in '92. '93, '94 we dropped our membership in the API.
Q And was there a particular reason why the membership was dropped?
A Cost.
Q Was the American Petroleum Institute a source of information regarding other gasoline companies' experiences with gasoline in terms of environmental
10:34:00 am fate?
A They were one of the sources, yes.
Q And just so I'm clear, Ultramar stopped becoming a member of American Petroleum Institute in

approximately 1992 because of cost?
A Yeah, '92, '93. Cost and the fact that we felt that we were getting similar type information from other associations.
Q All right. And what other associations would those be?
A The main one was the NPRA, National Petroleum Refiners Association, and then there was also a West Coast association. I believe it was WSPA, Western States Petroleum Association.
Q And when was Ultramar a member of the NPRA?
A They were, they've been a member, you know, from when I started with the company until when I left.
Q Okay. And how long has Ultramar been a member of WSPA?
A My recollection would be they probably were, became a member after the acquisition of the Wilmington refinery which was in '89. I mean, excuse me, prior to that they could have been an associate member, but I don't remember that.
Q And did the NPRA generate materials that it shared with members regarding the environmental fate of gasoline?
A The NPRA shares materials on environmental matters, gasoline and otherwise, yes.

10:34:30 am
10:35:00 am
10:35:30 am

testified earlier that Ultramar was also involved in the retail gasoline business at the time?
A Yes.
Q As part of the choice of oxygenates, was any consideration given to the underground storage tanks at the retail facilities in terms of the choice of oxygenates?
11:01:30 am A No.
Q Was there any, in conjunction with this decision-making process on the choice of oxygenates, was any program instituted regarding tank upgrades or tank inspections of any sort?
A Well, at that same period of time the company was upgrading all of their underground storage tanks and
11:02:00 am their retail stations to meet, you know, a deadline when you were supposed to have these, you know, there was a deadline. I can't remember what it was. It could have been sometime in '98, '99. But we were upgrading, basically on a program to upgrade all of the underground storage tanks to meet the new regulations.
Q And you think that this program culminated either
11:02:30 am in 1998 or 1999?
A I believe so. And I think -- and, again, it's my recollection that we were, you know, somewhere like 60

to 70 percent done when I left the company in '97. And I know that at that point in time we were essentially ahead of the program as far as the number of sites we needed to get done on a yearly basis.

Q So when you left the company in 1977, taking the converse of what you said, approximately 30 to 40 percent of the Ultramar retail stations had not yet had their underground storage systems upgraded?

A Yeah, they would be less than 30 percent.

Q Less than 30 percent but more than 25 percent?

A Hell, again, it's somewhere in that range.

Q All right. And do you know what type of storage tanks were being installed to meet the California government regs which required upgraded storage tank facilities at retail stations?

A I'm pretty sure that in all sites that we were working on we were going to double-walled tanks.

Q Do you know if the upgraded -- well, did Ultramar own a number of its own stations?

A Yes, they did.

Q When I say own, that means they own the site where the gas station was located?

A I believe in most of the cases they owned the land where the station was located, yes.

Q And that would also include obviously the

11:03:00 am
11:03:30 am
11:04:00 am

A Yes.
Q From 1996 until you retired from the company, are you aware of any program by Ultramar that required
11:10:00 am independent dealers that purchased gasoline from Ultramar to certify that their tanks weren't leaking to Ultramar prior to a purchase of gas from Ultramar?
A I was not aware of that, no.
Q Are you aware of any program at Ultramar to determine if the non-branded stations receiving Ultramar gas after 1996 in California -- strike that
11:10:30 am question.

Do you know if Ultramar after 1996 in California had any program to inspect unbranded stations that received Ultramar gasoline in terms of
11:11:00 am whether they had any leaks in their underground storage tank systems?
A No, I was not aware of any.
Q Now, going back to the decision-making analysis that was undertaken when Ultramar was determining which oxygenate to select, do you know if any members
11:11:30 am of Ultramar ever asked ARCO Chemical to discuss their experiences with MTBE in terms of its environmental fate?
A I'm not aware of any, any requests, no.
Q Do you recall as you sit here today ever seeing

an oxygenate in 1996?
A No, I'm not.
Q Did you attempt to contact anybody at Shell to discuss their experience with the use of MTBE in gasoline --
A No.
Q -- prior to 1996?
A No, I did not.
Q Do you know of anybody at Ultramar that attempted to contact anybody at Shell regarding their experience with MTBE in gasoline prior to 1996?
A No.
Q Are you aware of anybody at Ultramar that attempted to contact anybody at ARCO regarding its experience with MTBE in conjunction with the decision-making process to use MTBE in 1996?
A No, I'm not.
Q Did Ultramar engage in any independent research regarding the environmental fate of MTBE before it decided to use it as an oxygenate in gasoline?
MS. MILNER: Objection. Asked and answered.
MR. SAWYER: Go ahead, sir.
THE WITNESS: Did we do independent research?
MR. SAWYER: Q Yes, sir, in-house research.
A No, we did not.

Q In conjunction with the Environmental Impact Report with respect to the Wilmington refinery modifications when you were going to go to MTBE, do you know if Ultramar did any independent in-house analysis of the environmental effects of MTBE as part of the EIR process?

MS. MILNER: Objection. Misstates the witness' prior testimony. He testified that the construction and the permitting was done for, not for MTBE but for the CARB RFG requirements.

MR. SAWYER: That's a point.

Q Was any environmental impact analysis done with respect to the use of or the introduction of MTBE at the Wilmington refinery?

A Not that I'm aware of unless -- I mean, here again, it potentially could have been required under the Environmental Impact Report but I wasn't aware of an independent study.

Q So you're not sure whether or not it was included as part of the Environmental Impact Report?

A No, I'm not.

Q When MTBE was first introduced into gasoline and Ultramar at its Wilmington refinery facility, was there any analysis undertaken as to whether any warning should accompany the sale of the gasoline?

11:19:30 am
A Again, it would fall under the regulations as far as any kind of product labeling requirements that were required at that time. And so if there, if there was a requirement to have the products labeled appropriately, I mean, you know, with the use of MTBE, then I'm sure that we would have followed that.
Q Just so I'm clear on your testimony then, if the
11:20:00 am
government required Ultramar to issue a warning, then they'd issue a warning, but they weren't going to do any warnings on their own; is that correct?
A Correct.
MS. MILNER: Objection. Argumentative.
MR. SAWYER: Did you get the answer, "Correct"? All right. Thank you.
Q In conjunction with the decision-making process
11:20:30 am
of selecting the oxygenate to use to meet CARB requirements, were there any discussions regarding the affects of MTBE on groundwater?
MS. MILNER: I'm sorry, could I ask the court reporter to repeat that.
MR. SAWYER: Absolutely.
MS. MILNER: Thanks.
(Thereupon the record was read back.)
THE WITNESS: I don't remember any specific
11:21:00 am
discussions about that, no.

MR. SAWYER: Q Do you have any recollection whatsoever regarding that particular subject matter coming up during the decision-making process?
A No, I don't.
Q At some point after the decision was made to use MTBE at the Wilmington refinery and to the point that you retired from the company, do you recall any discussions regarding the effects of MTBE on groundwater?
A No.
Q From the point that Ultramar first used MTBE as an oxygenate at the Wilmington refinery until the point you retired, do you recall whether or not there were any meetings at which the subject of MTBE groundwater contamination was discussed?
A I don't remember any. No, I don't.
Q Now, you indicated that Ultramar relied on what you called its outside experts to, on the issue of choice of oxygenates and its impact on the environment. Do you recall ever reviewing any literature from any of the organizations that Ultramar belonged to regarding the effects of MTBE on groundwater?
A I don't remember any, receiving anything on that.

11:21:30 am
11:22:00 am
11:22:30 am
11:23:00 am

CERTIFICATE OF CERTIFIED SHORTHAND REPORTER

I, CATHLEEN S. SLOCUM, a Certified Shorthand Reporter, in and for the State of California, duly appointed and commissioned to administer oaths, do hereby certify:

That I am a disinterested person herein; that the witness, JOEL MASCITELLI, named in the foregoing deposition, was by me duly sworn to testify the truth, the whole truth, and nothing but the truth; that the deposition was reported in shorthand by me, Cathleen S. Slocum, a Certified Shorthand Reporter of the State of California, and thereafter transcribed into typewriting.

IN WITNESS WHEREOF, I have hereunto set my hand as a Certified Shorthand Reporter on this 31 of July, 2000.

Cathleen Slocum

Cathleen Slocum
Certified Shorthand Reporter
License Number 2822

--o0o--

EXHIBIT 16

Memorandum

San Francisco, CA
June 11, 1986

MARKETING ENVIRONMENTAL
CONCERNS REGARDING
THE USE OF MTBE IN MOGAS

MR. O. T. BUFFALOW:

We are currently involved in the cleanup of an aquifer in Maryland contaminated by several different company's leaking underground storage tanks. The companies involved, including Gulf, were utilizing MTBE (Methyl Tertiary Butyl Ether), a motor gasoline octane improver. The EPA has shown great interest in the removal of MTBE from this contaminated aquifer. A literature study by the API has shown that MTBE, and the related octane enhancer IPE (Isopropyl Ether), have several disturbing properties. Both MTBE and IPE:

- have relatively high solubilities in water - an order of magnitude higher than BTX (Benzene, Toluene, Xylene)
- have relatively high mobility in the subsurface - will move to the leading edge of a contamination plume
- have low odor and taste thresholds in water
- are relatively stable with respect to biodegradation
- are expensive to remove from water - air stripping is required with follow-up treatment probably necessary to attain the extremely low discharge concentrations likely to be mandated by a governmental agency

We understand that Chevron currently utilizes MTBE at Port Arthur extensively and to a lessor extent in Pascagoula. We further understand that MTBE is anticipated to be used at some other Chevron refineries as the EPA mandated lead-phasedown continues to impact octane requirements. This projected increase in MTBE utilization concerns Marketing for two major reasons:

- MTBE utilization could increase the cost to clean up leaks at service stations and terminals; and
- MTBE could become a significant constitutent of mogas storage water-draws and attact regulatory attention to Marketing terminal effluent. Marketing terminals generally route effluent through a simple API separator and have no facilities to treat or reduce dissolved component contamination.

Please let us know what refineries are currently using MTBE or IPE. Although we expect usage varies with operating necessities at the refineries, please let us know which blends generally utilize MTBE/IPE and at what average concentrations. Please let us know what your future plans are with respect to these additives.

Thank you for your cooperation.

D. W. CALLAHAN

JK:J-2

cc: Mr. R. W. Kreutzen - Please let us know if you are aware of any Chevron NPDES permits with MTBE limits, or expect future regulatory activity in this area.

Circulating File - 2500

EXHIBIT 17

Memorandum

San Francisco, CA
December 30, 1986

MTBE

MR. R. L. ARSCOTT:

Chevron USA Downstream has used MTBE in gasoline for a number of years. Future use as an octane enhancer is likely to increase; and government actions may stimulate additional use to reduce CO emissions from motor vehicles and/or to reduce the aromatics in gasoline. We are currently evaluating the economics of building an MTBE plant.

Recently, we have learned of concerns about potential adverse health and environmental effects of MTBE. For example, the attachments indicate that:

- The U.S. Interagency Testing Committee has recommended chronic inhalation toxicity testing with monitoring of concentrations at terminals and service stations, and
- The Maine Department of Environmental Protection has recommended either banning MTBE or imposing special storage requirements to protect groundwater.

Marketing has also heard of some concern in Europe that may spill over to the U.S.

We would appreciate your assessment of available information concerning health and environmental effects of MTBE and of the potential for additional government limitations on the use of MTBE in gasoline.

D. B. SMITH

Original Signed by DIXON B. SMITH / Original Signed by M.A. JAVINSKY

BB:jsc

cc: Mr. C. L. Blackwell
Mr. O. T. Buffalow
Mr. D. W. Callahan
Mr. R. D. Cavalli
Mr. H. S. Quilliey
Mr. E. E. Spitler
Mr. R. W. Vose

bcc: JPG
MAJ
WBK
WHL
DAB

CH 009137

Alcohol Week

An exclusive report on alcohol fuels and feedstocks Vol. 1 No. 47 December 8, 1986

Washington Publication

MAINE CALLS FOR DROPPING MTBE; CITES IT AS GROUNDWATER CONTAMINANT

A report detailing the hazards of methyl tertiary butyl ether (MTBE) as a groundwater contaminant has just been released by the Maine Dept. of Environmental Protection. According to the report, MTBE is not highly toxic but does spread through an aquifer more rapidly than other gasoline components, thereby concentrating the residual gasoline while contaminating drinking wells beyond the radius where gasoline would normally reach. The report concludes that MTBE should either be banned from addition to gasoline or at least stored in extra-secure containers.

MTBE was found to be soluble in water at 4.3%, compared to the relative insolubility of benzene at 0.18%, toluene at 0.05% and xylene at 0.02%. Since benzene, toluene and xylene are more soluble in ethers than in water they, along with the larger hydrocarbon molecules of gasoline, tend to linger and concentrate while the MTBE rushes into fresh water supplies, the report says.

Although Maine has set a maximum contaminant level for MTBE at 50 parts per billion (ppb), concentrations of 690 ppb were discovered in a drinking well near a gasoline/MTBE blend spill. At that site,

(continued on page 7)

the concentration of other gasoline components was only 10 ppb. The well nearest the spill had concentrations of up to 126,000 ppb gasoline plus MTBE, the report states. At another site, total concentrations exceeded 600,000 ppb in contrast to usual maximum concentrations for gasoline components near spills of only 10-20,000 ppb. The point is that MTBE not only leads other hydrocarbons through the aquifer but, as it spreads away, concentrates the remaining hydrocarbons, one of the authors said.

"Groundwater contaminated with MTBE is difficult to remediate," the report states. Carbon filtration is not cost-effective for MTBE since a 2-cu-ft bed used to treat household water only lasts a month or less at MTBE concentrations of as low as 10 ppb.

The report states that MTBE, now one of the top 50 chemicals produced in the U.S., is a very popular oxygenate in lieu of tetra-ethyl lead. Some 30 plants now produce MTBE; Texas Petrochemicals and ARCO are the largest producers. An additional 20 plants are planned, the report states. Of the U.S. 60,000 barrels/day MTBE production, 95% originates in Texas. MTBE was first produced by ARCO in the 1960s when the company patented a process for removing branched olefins like isobutylene from hydrocarbons streams, the report states. The isobutylene is then combined with methanol. MTBE was not commercially produced until 1979 and production has increased by about 40% each year since 1980, the report states. It is currently used in about 10% of the U.S. gasoline supply but the proportion of gasolines blended with MTBE is expected to increase dramatically in coming years. Although the U.S. Environmental Protection Agency allows blending up to 11%, it is usually added at between 2% and 7% and mostly in unleaded premium gasolines.

Claims made about MTBE are that it has an octane blending value greater than that of toluene, reformate or alkylate; is compatible with all types of automobile materials; does not phase-separate as alcohols do; and that its use in gasoline reduces carbon monoxide and hydrocarbon emissions in most cars, the report states.

Not only does MTBE's greater solubility and lower ability to stick with soil and biological particles mean that its plume around a leak is greater than that of other gasoline components, but it also acts as a cosolvent for the gasoline components, thereby dragging them along behind, the report says. "The result is that the sum total of all dissolved gasoline components in groundwater is increased."

Although MTBE is not particularly toxic and is not carcinogenic, it has a "terpene-like" or "chemical" odor. "Our first contamination case, in 1984, was initially mistaken for one of hazardous waste leachate because of the unusual smell," it states. The odor can be detected at water concentrations as low as 20-50 ppb, the report states. Years after a spill, most of the plume will be only MTBE as the other gasoline components are biodegraded.

The report gives four reasons for concern over the toxicity of MTBE and its presence in domestic well water: it is very mobile in groundwater so that its concentration in a well may vary radically from week to week; plumes of MTBE in groundwater are associated with plumes of gasoline with its more varied and toxic components; MTBE is an irritant; and MTBE is probably a nervous system depressant like other ethers, and benzene, toluene and xylene.

MTBE is not the only villain when it comes to gasoline spills, however, the source said. The report offers three approaches regarding the MTBE problem, some of which would indirectly indict other gasoline additives including ethanol and methanol. Firstly, the report states that there is reason enough to call for the abandonment of MTBE as an additive in gasoline stored underground. Similarly, other octane enhancers including ethanol, methanol, and tertiary butyl alcohol may be equally soluble and have similar environmental effects to MTBE. Secondly, if MTBE use must continue, it by itself and when blended in gasoline should be stored only in double-contained facilities.

Legal Retention at MSXSOC

From: Marshall GR (Glen) at MSXSOPC
Sent: Friday, May 29, 1998 5:36 PM
To: Stanley CC (Curtis) at MSXWHWTC
Cc: Chistolini C. Wayne [STAR]
Subject: RE:

We (Shell) are also moving on said focus. "Achilles Heel" of systems has always been the "Bubba-factor".....the best intentions of hardware manufacturers and designers being ultimately defeated by poor installation and maintenance practices. Have been working last 2 years with Oy U-Cont (Varkaus, Finland) and Trusco Tanks (Fresno, CA) on a modular UST system manufactured in a factory (controlled environment) by properly trained personnel under constant supervision and inspection. Initial evaluations indicate a significantly more reliable system installed with roughly 20%+ savings in total project time and costs (related to UST portion of project). LA City Fire loved concept. Have two projects (No permits in LA Basin now. Coupled with our "Compliance Management Concept" (Veeder-Root Simplicity), overall concept could provide significant movement towards what UST system operation should have been all along. Advise if further concept details desired.

Glen R. Marshall, P.E.
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-----Original Message-----
From: Stanley CC (Curtis) at MSXWHWTC
Sent: Friday, May 29, 1998 9:03 AM
To: Marshall GR (Glen) at MSXSOPC
Subject: FW:

Glen,

I told API that they had better have a project on slate to evaluate existing systems and new system design, installation, and operations. I already have a good idea what Santa Clara is going to find and if the industry isn't ready with an adequate response/solution, we are all going to look bad. I foresee many agencies requiring extensive groundwater monitoring systems to evaluate whether or not MTBE is being released into the environment, especially in environmentally sensitive areas (near wells, fractured bedrock, etc.).

Curtis C. Stanley
Environmental Technology Directorate - Soil and Groundwater
Westhollow Technology Center
(phone-☺) 281-544-7675 (fax-☹)) 281-544-8727
e-mail: ccstanley@shellus.com
(This communication per applicable agreements between our respective companies.)

-----Original Message-----
From: Judy Shaw [SMTP:shaw@api.org] <mailto:[SMTP:shaw@api.org]>
Sent: Friday, May 29, 1998 8:57 AM
To: Al Jessel; Brian Hamey; C. Fairbrother; Carol Fairbrother; Curt Stanley; Dave Peirce; David Smith; Don Gilson; Eric Vogt; Gene Mancini; Georgia.Callahan; Gerry.Raabe; Gweneyette Broussard; James Rocco; Jeff Sickenger; Jim Stevenson; John Taunton; Lee Hoffman; Mark Saperstein; Mary Kate Kell; Mike Lobue; Mike Wang; Ned Seppi; Ron Benton; Tim Buscheck; William Doyle
Cc: Alexis Steen; Bill Bush; Bill Frick; Bob Greco; bruce bauman; Carol Henry; Chuck Krambuhl; David Deal; David Lax; Debi Tulou; Dee Gavora; Eldon Rucker; Howard Feldman; Jim Williams (MDM); Karen Inman; Kim Ashton; Larry Magni; Marc Meteyer; Martha Jordan; Molly Sinclair; Rick Brown; Robert Barter; Ron Chittim; Theresa Pugh; Tom Lareau; Valerie Ughetta
Subject:

You need to look at the following; it relates to the source identification /protection discussion we had the other day.

EXHIBIT 18

SECTION 1 CHEMICAL PRODUCTS & COMPANY IDENTIFICATION

ULTRAMAR, INC.
SAFETY AND LOSS CONTROL DEPARTMENT
24-HOUR EMERGENCY TELEPHONE NUMBER

P.O. BOX 93102
LONG BEACH, CALIFORNIA 90809-3102
(310) 491-6795 OR (310) 435-5832

SUBSTANCE: UNLEADED GASOLINE WITH MTBE

TRADE NAMES/SYNONYMS:
ULTNA163

CHEMICAL FAMILY:
Mixture

CREATION DATE: 02/16/93 REVISION DATE: 06/30/94

SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT: GASOLINE, AUTOMOTIVE, UNLEADED
CAS NUMBER: 8006-61-9
PERCENTAGE: 85-90

COMPONENT: METHYL TERT-BUTYL ETHER
CAS NUMBER: 1634-04-4
PERCENTAGE: 10-15

COMPONENT: BENZENE
CAS NUMBER: 71-43-2
PERCENTAGE: >0.1

SECTION 3 HAZARDS IDENTIFICATION

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
Clear, colorless to amber, aromatic, volatile liquid.
Cancer hazard (contains material which can cause cancer in humans). Risk of cancer depends on duration and level of exposure. Causes respiratory tract, skin and eye irritation. May cause blood disorders. May cause convulsions. May damage nerves. May affect the central nervous system. May cause adverse reproductive effects. May cause brain damage. May cause hearing loss. May affect the heart. May affect the kidneys. May affect the liver. May damage the lungs. May cause visual disturbances. Flammable liquid and vapor. May cause flash fire.
Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Keep away from all ignition sources. Keep container tightly closed. Wash thoroughly after handling. Use only with adequate ventilation. Handle with caution.

POTENTIAL HEALTH EFFECTS:
INHALATION:

SHORT TERM EFFECTS: May cause irritation. Additional effects may include paleness, flushing, ringing in the ears, lack of appetite, nausea, vomiting, difficulty speaking, difficulty swallowing, chest pain, difficulty breathing, irregular heartbeat, headache, weakness, drowsiness, drunkeness, feeling of well-being, confusion, disorientation, nervousness, restlessness, sleeplessness, numbness, twitching, visual disturbances, suffocation, lung damage, blood disorders, nerve effects, paralysis, convulsions, shock, unconsciousness and coma.
LONG TERM EFFECTS: In addition to effects from short term exposure, weight loss, low blood pressure, loss of memory, hearing loss, bruising, kidney damage, nerve damage and brain damage may occur. May also cause reproductive effects and cancer.

SKIN CONTACT:
SHORT TERM EFFECTS: May cause irritation. Additional effects may include blisters, blood in the urine, low blood pressure, lung damage and kidney damage.
LONG TERM EFFECTS: In addition to effects from short term exposure, burns, tingling sensation and nerve effects may occur.

EYE CONTACT:
SHORT TERM EFFECTS: May cause irritation. Additional effects may include spastic winking.
LONG TERM EFFECTS: In addition to effects from short term exposure, cataracts may occur.

INGESTION:
SHORT TERM EFFECTS: May cause gastrointestinal irritation. Additional effects may include coughing, paleness, flushing, fever, nausea, vomiting, diarrhea, chest pain, difficulty breathing, irregular heartbeat, headache, weakness, drunkeness, feeling of well-being, confusion, disorientation, nervousness, restlessness, excitation or drowsiness, twitching, visual disturbances, bluish skin color, suffocation, lung damage, liver damage, paralysis, convulsions, unconsciousness, coma and heart failure.
LONG TERM EFFECTS: In addition to effects from short term exposure, anemia and impotence may occur. May also cause reproductive effects and cancer.

CARCINOGEN STATUS:
OSHA: Y
NTP: Y
IARC: Y

SECTION 4 FIRST AID MEASURES

INHALATION:
FIRST AID- Remove from exposure area to fresh air immediately. Perform artificial respiration if necessary. Maintain airway, blood pressure and respiration. Keep warm and at rest. Treat symptomatically and supportively. Get medical attention immediately. Qualified medical personnel should consider administering oxygen.

SKIN CONTACT:
FIRST AID- Remove contaminated clothing and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.

EYE CONTACT:

FIRST AID- Wash eyes immediately with large amounts of water or normal saline. occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.

INGESTION:
FIRST AID- Treat symptomatically and supportively. Get medical attention immediately. Maintain airway, blood pressure and respiration. If vomiting occurs, keep head lower than hips to help prevent aspiration. Do not give anything by mouth or induce vomiting if person is unconscious or otherwise unable to swallow. If a poisonous substance has been ingested, it is generally suggested to proceed with the following: Induce emesis. Qualified medical personnel should consider the following: Perform gastric lavage (if there is no sign of perforation or corrosive injury). If a corrosive substance has been ingested and perforation has not occured, it is generally suggested to proceed with the following: Rinse mouth with water. Give milk or water.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARD:
Dangerous fire hazard when exposed to heat or flame.

Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back.

Vapor-air mixtures are explosive.

EXTINGUISHING MEDIA:
Dry chemical, carbon dioxide, water spray or regular foam (1993 Emergency Response Guidebook, RSPA P 5800.6).

For larger fires, use water spray, fog or regular foam (1993 Emergency Response Guidebook, RSPA P 5800.6).

FIREFIGHTING:
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire (1993 Emergency Response Guidebook, RSPA P 5800.6, Guide Page 27).

Extinguish only if flow can be stopped; use water in flooding amounts as fog, solid streams may spread fire. Cool containers with flooding amounts of water. apply from as far a distance as possible. Avoid breathing vapors, keep upwind. Evacuate to a radius of 1500 feet for uncontrollable fires. Consider evacuation of downwind area if material is leaking.

Water may be ineffective (NFPA 325M, Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids, 1991)

FLASH POINT: -45 F (-43 C) (CC)
LOWER FLAMMABLE LIMIT: 1.2%
UPPER FLAMMABLE LIMIT: 7.6%
AUTOIGNITION: 536-853 F (286-456 C)
FLAMMABILITY CLASS(OSHA): IB

HAZARDOUS COMBUSTION PRODUCTS:
Thermal decomposition products may include toxic oxides of carbon.

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL SPILL:
Shut off ignition sources. Stop leak if you can do it without risk. Use water spray to reduce vapors. For small spills, take up with sand or other absorbent material and place into containers for later disposal. For larger spills, dike far ahead of spill for later disposal. No smoking, flames or flares in hazard area. Keep unnecessary people away; isolate hazard area and restrict entry.

Reportable Quantity (RQ):
The Superfund Amendments and Reauthorization Act (SARA) Section 304 requires that a release equal to or greater than the reportable quantity established for that substance be immediately reported to the local emergency planning committee and the state emergency response commission (40 CFR 355.40). If the release of this substance is reportable under CERCLA Section 103, the National Response Center must be notified immediately at (800) 424-8802 or (202) 426-2675 in the metropolitan Washington, D.C. area (40 CFR 302.6).

WATER SPILL:
The California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) prohibits contaminating any known source of drinking water with substances known to cause cancer and/or reproductive toxicity.

SECTION 7 HANDLING AND STORAGE

Observe all federal, state and local regulations when storing this substance.

Store in accordance with 29 CFR 1910.106.

Bonding and grounding: Substances with low electroconductivity, which may be ignited by electrostatic sparks, should be stored in containers which meet the bonding and grounding guidelines specified in NFPA 77-1983, Recommended Practice on Static Electricity.

Store away from incompatible substances.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS:
GASOLINE (BULK HANDLING):
300 ppm (900 mg/m3) OSHA TWA; 500 ppm (1,500 mg/m3) OSHA STEL
300 ppm (900 mg/m3) ACGIH TWA; 500 ppm (1,500 mg/m3) ACGIH STEL

BENZENE:

1 ppm OSHA TWA; 5 ppm OSHA 15 minute STEL; 0.5 ppm OSHA action level
10 ppm (30 mg/m3) ACGIH TWA;
ACGIH A2-Suspected Human Carcinogen
(Notice of Intended Changes 1990-91)
0.1 ppm (0.32 mg/m3) NIOSH recommended 8 hour TWA;
1 ppm (3.2 mg/m3) NIOSH recommended 15 minute ceiling

Measurement method: Charcoal tube; carbon disulfide; gas chromatography with flame ionization detection; (NIOSH Vol. III # 1500, Hydrocarbons).

10 pounds CERCLA Section 103 Reportable Quantity
Subject to SARA Section 313 Annual Toxic Chemical Release Reporting
Subject to California Proposition 65 cancer and/or reproductive toxicity warning and release requirements- (February 27, 1987)

OSHA revoked the final rule limits of January 19, 1989 in response to the 11th Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993. See 29 CFR 1910.1000 (58 FR 35338)

METHYL TERT-BUTYL ETHER:
40 ppm (140 mg/m3) ACGIH TWA (proposed addition 1993-94)

Subject to SARA Section 313 Annual Toxic Chemical Release Reporting

VENTILATION:
Provide local exhaust or general dilution ventilation to meet published exposure limits. Ventilation equipment should be explosion-proof if explosive concentrations of dust, vapor or fume are present.

EYE PROTECTION:
Employee must wear splash-proof or dust-resistant safety goggles to prevent eye contact with this substance.

Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance, the employer should provide an eye wash fountain within the immediate work area for emergency use.

CLOTHING:
Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance.

Any clothing wet with a flammable liquid should be immediately removed at the location where it is wetted to prevent burns from possible ignition.

GLOVES:
Employee must wear appropriate protective gloves to prevent contact with this substance.

RESPIRATOR:
The following respirators are recommended based on information found in the physical data, toxicity and health effects sections. They are ranked in order from minimum to maximum respiratory protection.
The specific respirator selected must be based on contamination levels found in the work place, must be based on the specific operation, must not exceed the working limits of the respirator and must be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety

and Health Administration (NIOSH-MSHA).

Any chemical cartridge respirator with organic vapor cartridge(s) and a full facepiece.

Any gas mask with organic vapor canister (chin-style or front- or back-mounted canister), with a full facepiece.

Any type 'C' supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet or hood operated in a continuous-flow mode.

Any self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

DESCRIPTION: Clear, colorless to amber, aromatic, volatile liquid.
BOILING POINT: 100-400 F (38-204 C)
VAPOR PRESSURE: not available
VAPOR DENSITY: 3.0-4.0
SPECIFIC GRAVITY: 0.7-0.8
WATER SOLUBILITY: insoluble
ODOR THRESHOLD: 0.25 ppm
SOLVENT SOLUBILITY: Absolute alcohol, ether, chloroform, benzene

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SECTION 10 STABILITY AND REACTIVITY

REACTIVITY:
Stable under normal temperatures and pressures.

CONDITIONS TO AVOID:
Avoid contact with heat, sparks, flames, or other sources of ignition. Vapors may be explosive. Avoid overheating of containers; containers may violently rupture in heat of fire. Avoid contamination of water sources.

INCOMPATIBILITIES:
GASOLINE, AUTOMOTIVE, UNLEADED:
OXIDIZERS (STRONG): Fire and explosion hazard.

METHYL TERT-BUTYL ETHER:
ACIDS (STRONG): Incompatible.
BASES (STRONG): Incompatible.

OXIDIZERS (STRONG): Fire and explosion hazard.
See also ethers.

ETHERS:
BORON TRIIODIDE: Vigorous reaction.

BENZENE:
ACIDS (STRONG): Incompatible.
ALLYL CHLORIDE WITH DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE: Possible explosion.
ARSENIC PENTAFLUORIDE + POTASSIUM METHOXIDE: Explosive interaction.
BASES (STRONG): Incompatible.
BROMINE + IRON: Incompatible.
BROMINE PENTAFLUORIDE: Fire and explosion hazard.
BROMINE TRIFLUORIDE: Possible explosion or ignition.
CHLORINE: Explosion in the presence of light.
CHLORINE TRIFLUORIDE: Violent reaction with possible explosion.
CHROMIC ANHYDRIDE (POWDERED): Ignition.
DIBORANE: Spontaneously explosive reaction in air.
DIOXYGEN DIFLUORIDE: Ignition; even at reduced temperatures.
DIOXYGENYL TETRAFLUOROBORATE: Ignition reaction.
INTERHALOGEN COMPOUNDS: Ignition or explosion.
IODINE HEPTAFLUORIDE: Ignition on contact.
IODINE PENTAFLUORIDE: Violent interaction above 50 C.
NITRIC ACID: Violent or explosive unless properly agitated and cooled.
NITRYL PERCHLORATE: Explosive interaction.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN (LIQUID): Explosive mixture.
OZONE: Formation of explosive gelatinous ozonide.
PERCHLORATES (METAL): Formation of explosive complex.
PERCHLORYL FLUORIDE + ALUMINUM CHLORIDE: Formation of shock sensitive compound.
PERMANGANATES + SULFURIC ACID: Possible explosion.
PERMANGANIC ACID: Explosion hazard.
PEROXODISULFURIC ACID: Explosion hazard.
PEROXOMONOSULFURIC ACID: Explosive interaction.
POTASSIUM PEROXIDE: Ignition.
SILVER PERCHLORATE: Formation of explosive complex.
SODIUM PEROXIDE + WATER: Ignition.
URANIUM HEXAFLUORIDE: Violent reaction.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products may include toxic oxides of carbon.

POLYMERIZATION:
Hazardous polymerization has not been reported to occur under normal temperatures and pressures.

SECTION 11 TOXICOLOGY INFORMATION

GASOLINE, AUTOMOTIVE, UNLEADED:
(Data derived from unspecified and unleaded gasoline)
IRRITATION DATA: 500 mg/24 hours skin-rabbit mild; 500 ppm/1 hour eye-man moderate; 140 ppm/8 hours eye-human mild.
TOXICITY DATA: 900 ppm/1 hour inhalation-man TCLo; 300 gm/m3/5 minutes

inhalation-rat LC50; 300 gm/m3/5 minutes inhalation-mouse LC50; 300 gm/m3/5 minutes inhalation-guinea pig LC50; 30000 ppm/5 minutes inhalation-mammal LCLo; 18,000 mg/kg oral-rat LD50; 13.6 gm/kg oral-rat LD50 (AETODY); 53 mg/kg parenteral-man TDLo; tumorigenic data (RTECS).
CARCINOGEN STATUS: Human Inadequate Evidence, Animal Limited Evidence (IARC Group-2B). In studies with mice and rats by inhalation, an increased incidence of hepatocellular adenomas and carcinomas was produced in female but not male mice; an increased incidence of adenomas and carcinomas of the kidney was produced in male but not female rats.
LOCAL EFFECTS: Irritant- inhalation, skin, eye.
ACUTE TOXICITY LEVEL: Relatively non-toxic by inhalation and ingestion.
TARGET EFFECTS: Central nervous system depressant; simple asphyxiant.
ADDITIONAL DATA: The use of alcoholic beverages enhances the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

BENZENE:
IRRITATION DATA: 20 mg/24 hours skin-rabbit moderate; 15 mg/24 hours open skin-rabbit mild; 88 mg eye-rabbit moderate; 2 mg/24 hours eye-rabbit severe.
TOXICITY DATA: 2000 ppm/5 minutes inhalation-human LCLo; 2 pph/5 minutes inhalation-human LCLo; 65 mg/m3/5 years inhalation-human LCLo; 100 ppm inhalation-human TCLo; 150 ppm/1 year intermittent inhalation-man TCLo; 10000 ppm/7 hours inhalation-rat LC50; 300 ppm/6 hours/13 weeks intermittent inhalation-rat TCLo; 300 ppm/6 hours/99 weeks intermittent inhalation-rat TCLo; 9980 ppm inhalation-mouse LC50; 103 ppm/6 hours/5 days intermittent inhalation-mouse TCLo; 221 ppm/6 hours/7 days intermittent inhalation-mouse TCLo; 48 ppm/6 hours/14 days intermittent inhalation-mouse TCLo; 10 ppm/6 hours/10 weeks intermittent inhalation-mouse TCLo; 300 ppm/6 hours/13 weeks intermittent inhalation-mouse TCLo; 300 ppm/6 hours/16 weeks intermittent inhalation-mouse TCLo; 302 ppm/6 hours/26 weeks intermittent inhalation-mouse TCLo; 100 ppm/6 hours/72 weeks intermittent inhalation-mouse TCLo; 146000 mg/m3 inhalation-dog LCLo; 170000 mg/m3 inhalation-cat LCLo; 45000 ppm/30 minutes inhalation-rabbit LCLo; 20000 ppm/5 minutes inhalation-mammal LCLo; >9400 mg/kg skin-rabbit LD50; >9400 mg/kg skin-guinea pig LD50; 50 mg/kg oral-man LDLo; 930 mg/kg oral-rat LD50; 6600 mg/kg/27 weeks intermittent oral-rat TDLo; 4700 mg/kg oral-mouse LD50; 2 gm/kg oral-dog LDLo; 88 mg/kg intravenous-rabbit LDLo; 1400 mg/kg subcutaneous-frog LDLo; 2890 ug/kg intraperitoneal-rat LD50; 340 mg/kg intraperitoneal-mouse LD50; 527 mg/kg intraperitoneal-guinea pig LDLo; 1500 mg/kg intraperitoneal-mammal LDLo; 194 mg/kg unreported-man LDLo; mutagenic data (RTECS); reproductive effects data (RTECS); tumorigenic data (RTECS).
CARCINOGEN STATUS: OSHA Carcinogen; Known Human Carcinogen (NTP); Human Sufficient Evidence, Animal Sufficient Evidence (IARC Group-1). Numerous case reports and series have suggested a relationship between exposure to benzene and the occurrence of various types of leukemia. Several case-control studies have also shown increased odds ratios for exposure to benzene, but mixed exposure patterns and poorly defined exposures render their interpretation difficult. Three independent cohort studies have demonstrated an increased incidence of acute nonlymphocytic leukemia in workers exposed to benzene.
LOCAL EFFECTS: Irritant- inhalation, skin, eye.
ACUTE TOXICITY LEVEL: Moderately toxic by inhalation and ingestion; slightly toxic by dermal absorption.
TARGET EFFECTS: Central nervous system depressant; bone marrow depressant. Poisoning may also affect the immune system and the heart.
AT INCREASED RISK FROM EXPOSURE: Persons with certain immunological

tendencies, poor nutrition, anemia and drug or chemically induced agranulocytemia.
ADDITIONAL DATA: Use of alcoholic beverages may enhance the toxic effects. Use of stimulants such as epinephrine may cause cardiac arrhythmias. May cross the placenta. Interactions with medications have been reported.

METHYL TERT-BUTYL ETHER:
TOXICITY DATA: 85 mg/L inhalation-rat LC50 (38MKAJ); 23,576 ppm/4h inhalation-rat LC50; 141 mg/m3/15 minutes inhalation-mouse LC50; >7405 mg/kg skin-rabbit LD50 (38MKAJ); 2962 mg/kg oral-rat LD50 (38MKAJ); 4 gm/kg oral-rat LD50.
CARCINOGEN STATUS: None.
ACUTE TOXICITY LEVEL: Moderately toxic by ingestion and inhalation; slightly toxic by dermal absorption.
TARGET EFFECTS: Central nervous system depressant.
AT INCREASED RISK FROM EXPOSURE: Persons with pre-existing skin disorders, eye problems or impaired respiratory function.

HEALTH EFFECTS
INHALATION:
GASOLINE, AUTOMOTIVE, UNLEADED:
IRRITANT/NARCOTIC/ASPHYXIANT/CARCINOGEN.
ACUTE EXPOSURE- At 160-270 ppm throat irritation may occur within several hours. At 2000 ppm mild anesthesia may occur within 30 minutes. Other symptoms of central nervous system depression may include headache, nausea, vomiting, dizziness, drowsiness, facial flushing, blurred vision, slurred speech, difficulty swallowing, staggering, confusion and euphoria. At higher levels dyspnea, pulmonary edema and bronchopneumonia may develop. Further depression may occur with weak respiration and pulse, nervousness, twitching, irritability, and ataxia. Severe intoxication may result in delirium, unconsciousness, coma, and convulsions with epileptiform seizures. The pupils may be constricted or, in comatose states, fixed and dilated or unequal; nystagmus may also occur. May also affect the liver, kidneys, spleen, brain, myocardium and pancreas. Death may be due to respiratory or circulatory failure or ventricular fibrillation. Extremely high concentration may cause asphyxiation.
CHRONIC EXPOSURE- With few exceptions, most of the reported effects of repeated inhalation are from intentional "sniffing" of gasoline rather than workplace exposure. Reported symptoms include headache, nausea, fatigue, anorexia and weight loss, pallor, dizziness, insomnia, memory loss, nervousness, confusion, muscular weakness and cramps, peripheral neuropathy, polyneuritis, and neurasthenia. It is unclear whether some of these symptoms may have been due to gasoline containing lead. Liver and and kidney damage are also possible. In a 90 day study, male but not female rats exhibited a severe, dose-related renal toxicity. In another study, an increase in renal adenomas and carcinomas in male rats and an increase in hepatocellular adenomas and carcinomas in female mice were reported.

BENZENE:
IRRITANT/NARCOTIC/BONE MARROW DEPRESSANT/CARCINOGEN.
ACUTE EXPOSURE- Concentrations of 3000 ppm may cause respiratory tract irritation; more severe exposures may result in pulmonary edema. Systemic effects are mainly on the central nervous system and depend on exposure time and concentration. No effects were noted at 25 ppm for 8 hours; signs of intoxication began at 50-150 ppm within 8 hours; at 500-1500 ppm

within 1 hour; were severe at 7500 ppm, within 30-60 minutes; and 20,000 ppm was fatal within 5-10 minutes. Effects may include nausea, vomiting, headache, dizziness, drowsiness, weakness, sometimes preceded by a brief period of exhilaration or euphoria, irritability, malaise, confusion, ataxia, staggering, weak, rapid pulse, chest pain and tightness with breathlessness, pallor, cyanosis of the lips and fingertips, and tinnitus. In severe exposures there may be blurred vision, shallow, rapid breathing, delirium, cardiac arrhythmias, unconsciousness, deep anesthesia, paralysis, and coma characterized by motor restlessness, tremors and hyperreflexia, sometimes preceded by convulsions. Recovery depends on the severity of exposure. Polyneuritis may occur and there may be persistent nausea, anorexia, muscular weakness, headache, drowsiness, insomnia, and agitation. Nervous irritability, breathlessness, and unsteady gait may persist for 2-3 weeks; a peculiar skin color and cardiac distress may persist for 4 weeks. Liver and kidney effects may occur, but are usually mild, temporary impairments. Chromosomal damage has been found after exposure to toxic levels. Although generally hematotoxicity is not a significant concern in acute exposure, delayed hematological effects, including anemia and thrombocytopenia, have been reported, as have petechial hemorrhages, spontaneous internal bleeding and secondary infections. In fatal exposures, death may be due to asphyxia, central nervous system depression, cardiac or respiratory failure and circulatory collapse, or occasionally, sudden ventricular fibrillation. It may occur within a few minutes to several hours, or cardiac arrythmia may occur at anytime within 24 hours. Also, death from central nervous system, respiratory or hemorrhagic complications may occur up to 5 days after exposure. Pathologic findings have included respiratory inflammation with edema and hemorrhage of the lungs, renal congestion, cerebral edema, and extensive petechial hemorrhages in the brain, pleurae, pericardium, urinary tract, mucous membranes, and skin.

CHRONIC EXPOSURE- Longterm exposure may cause symptoms referable to the central nervous, hematopoietic and immune systems. Early effects are vague and varied and may include headache, light-headedness, dizziness, nausea, anorexia, abdominal discomfort, and fatigue. Sore, dry throat, weakness, lethargy, malaise, drowsiness, nervousness, and irritability have also been reported. Later there may be dyspnea, pallor, slightly increased temperature, decreased blood pressure, rapid pulse, palpitations, and visual disturbances. Dizziness when cold water is placed in the ear and hearing impairment have been reported, as have diffuse cerebral atrophy associated with ataxia, tremors and emotional lability. Workers exposed to benzene in combination with other solvents have exhibited polyneuritis. Several case reports, one of them an acute exposure, suggest the possibility that systemic exposure may be associated with retrobulbar or optic neuritis. Occasionally hemorrhages in retina and conjunctiva occur and rarely neuroretinal edema and papilledema have accompanied the retinal hemorrhages. Hematological effects vary widely and may appear after a few weeks or many years of exposure or even many years after exposure has ceased. The degree of exposure below which no blood effects will occur cannot be established with certainty. In the early stages, there may be blood clotting defects due to morphological, functional and quantitative platelet alteration with resultant bleeding from the nose and gums, easy bruising and petechiae; leukopenia with predominant lymphocytopenia or neutropenia; and anemia which may be normochromic or macrocytic and hypochromic. Extramedullary hematopoiesis, splenomegaly, circulating immature marrow cells, and an initial increase in leukocytes, erythrocytes and platelets have also been reported.

The bone marrow may be hyper-, hypo- or normoplastic and does not always correlate with the peripheral blood picture. Also, the symptoms do not always parallel the laboratory findings. If treated at this stage, the effects appear reversible, although recovery may be protracted and there may be relapses. Decreased erythrocyte survival, hemolysis, capillary fragility, internal hemorrhages, iron metabolism disturbances, and hyperbilirubinemia have also been reported. Exposure to high levels for longer periods may result in aplasia and fatty degeneration of the bone marrow with pancytopenia. The most serious cases of aplastic anemia may be fatal due to hemorrhage and infection; death may occur within 3 months of diagnosis. Enormous variability in individual response, including non-dose dependent aplasia, and the finding of eosinophilia suggests that, in some cases, the blood dyscrasia may partially be an allergic reaction. Numerous case reports and series have suggested a relationship between exposure to benzene and the occurrence of various types of leukemia. Several case-control studies have also shown increased odds ratios for exposure to benzene, but mixed exposure patterns and poorly defined exposures render their interpretation difficult. Three independent cohort studies have demonstrated an increased incidence of acute nonlymphocytic leukemia in workers exposed to benzene. Several studies have also suggested a link between occupational exposure and multiple myeloma and lymphoma, both Hodgkin's and nonhodgkin's. Although aplastic anemia is probably the more likely consequence of longterm exposure, it is not uncommon for an individual surviving this, to go through a preleukemic phase into frank leukemia. Conversely, leukemia without precedent aplastic anemia can occur. In one study the range of time from the start of the exposure to the diagnosis of leukemia was 3-24 years. It has been suggested that the chromosomal aberrations which can arise in peripheral blood and bone marrow cells and persist for a long time after exposure ceases, may be associated with the increased incidence of leukemia. The immunosuppressive effect has also been suggested as being associated with the leukemogenesis. Adverse effects on the immunological system have been shown to make rabbits more susceptible to tuberculosis and pneumonia and may explain why the terminal event in some cases of benzene intoxication may be overwhelming infection. Exposed mice exhibited a tendency toward induction of lymphoid neoplasms. Rats exhibited an increased incidence of neoplasms, mainly carcinomas, at various sites. Menstrual disturbances have been reported more frequently in exposed women. Testicular damage has been reported in rats, rabbits and guinea pigs. Some animal studies have demonstrated embryo/fetotoxicity, sometimes at levels as low as 10 ppm and the potential for teratogenic effects such as decreased body weight and skeletal variants, have also been shown. Other studies have not produced any abnormalities or embryolethality.

METHYL TERT-BUTYL ETHER:
NARCOTIC.
ACUTE EXPOSURE- May cause irritation to the mucous membranes. Headaches, dizziness, sleepiness, anesthetic effects, weakness of distal muscles, and central nervous system depression may result from over-exposure.
CHRONIC EXPOSURE- Subacute exposure to 1000 and 3000 ppm caused reduced reaction to auditory stimuli, histologic inflammation of the nasal mucosa and trachea, and increased liver weights in rats. Symptoms of acute exposure may be produced by repeated or prolonged inhalation.

SKIN CONTACT:
GASOLINE, AUTOMOTIVE, UNLEADED:
IRRITANT.
ACUTE EXPOSURE- Liquid may cause irritation with erythema and pain. Prolonged or extensive contact may cause blistering and, in extreme cases epidermal necrolysis. A 12 year old boy partially immersed in a pool of gasoline for 1 hour experienced hypotension, abdominal tenderness, disseminated intravascular coagulation, transient hematuria, nonoliguric renal failure and an elevated serum amylase. Autopsy revealed cerebral edema, diffuse bilateral pneumonia, biventricular cardiac enlargement, toxic nephrosis, fatty infiltration of liver and peripancreatic fat necrosis.
CHRONIC EXPOSURE- Repeated or prolonged contact with the liquid may cause irritation, dermatitis and defatting of the skin with drying and cracking or burns and blistering. Some individuals may develop hypersensitivity, probably due to additives.

BENZENE:
IRRITANT.
ACUTE EXPOSURE- Direct contact may cause irritation. Effects may include erythema, a burning sensation, and with prolonged contact, blistering and edema. Under normal conditions, significant signs of systemic toxicity are unlikely from skin contact alone due to the slow rate of absorption; it may however, contribute to the toxicity from inhalation. Application to guinea pigs resulted in increased dermal permeability.
CHRONIC EXPOSURE- Repeated or prolonged contact defats the skin and may result in dermatitis with erythema, scaling, dryness, vesiculation, and fissuring, possibly accompanied by paresthesias of the fingers which may persist several weeks after the dermatitis subsides. Peripheral neuritis has also been reported. Secondary infections may occur. Tests on guinea pigs indicate sensitization is possible. Although animal studies have failed to establish a relationship between skin contact and a carcinogenic effect, most of the studies were inadequate; some papillomas and hematopoietic effects have been reported.

METHYL TERT-BUTYL ETHER:
ACUTE EXPOSURE- May cause slight irritation. May be absorbed through the skin.
CHRONIC EXPOSURE- Repeated and prolonged contact may cause dermatitis due to the defatting action.

EYE CONTACT:
GASOLINE, AUTOMOTIVE, UNLEADED:
IRRITANT.
ACUTE EXPOSURE- Concentrations between 270 and 900 ppm may cause a sensation of irritation often before signs such as conjunctival hyperemia are visible. Liquid splashed in the eyes may cause pain, smarting and slight, transient corneal epithelial disturbance. Blepharospasm and conjunctival hyperemia and edema may occur.
CHRONIC EXPOSURE- Repeated or prolonged exposure may cause conjunctivitis and possible gradual, irreversible loss of corneal and conjunctival sensitivity.

BENZENE:
IRRITANT.
ACUTE EXPOSURE- May cause irritation. Vapor concentrations of 3000 ppm are very irritating, even on brief exposure. Droplets cause a moderate burning sensation, but only a slight, transient corneal epithelial injury with rapid recovery.
CHRONIC EXPOSURE- Repeated or prolonged exposure may cause conjunctivitis. 50% of rats exposed to 50 ppm for more than 600 hours developed cataracts.

METHYL TERT-BUTYL ETHER:
ACUTE EXPOSURE- Liquid and vapor may cause mild to moderate irritation and tissue damage.
CHRONIC EXPOSURE- Prolonged or repeated contact may cause effects detailed in acute exposure.

INGESTION:
GASOLINE, AUTOMOTIVE, UNLEADED:
NARCOTIC.
ACUTE EXPOSURE- May cause irritation and burning of the gastrointestinal tract with nausea, vomiting and diarrhea. Absorption may cause initial central nervous stimulation followed by depression. Symptoms may include a mild excitation, restlessness, nervousness, irritability, twitching, weakness, blurred vision, headache, dizziness, drowsiness, incoordination, confusion, delirium, unconsciousness, convulsions and coma. Cardiac arrythmias may occur. Transient liver damage is possible. Direct or indirect aspiration may cause chemical pneumonitis with pulmonary edema and hemorrhage, possibly complicated by bacterial pneumonia, and less frequently, by emphysema and pneumonthorax. Signs of pulmonary involvement may include coughing, dyspnea, substernal pain, sudden development of rapid breathing, cyanosis, tachycardia and fever. Even small amounts may be fatal with death caused by cardiac arrest, asphyxia or respiratory paralysis. Depending on amount aspirated, death may occur rapidly or within 24 hours.
CHRONIC EXPOSURE- No data available.

BENZENE:
NARCOTIC/CARCINOGEN.
ACUTE EXPOSURE- May cause local irritation and burning sensation in the mouth, throat and stomach, and hemorrhagic inflammatory lesions of the mucous membranes in contact with the liquid. Signs and symptoms of systemic intoxication may include nausea, vomiting, headache, dizziness, weakness, staggering, chest pain and tightness, shallow, rapid pulse and respiration, breathlessness, pallor followed by flushing, and a fear of impending death. There may be visual disturbances, tremors, convulsions, ventricullar irregularities, and paralysis. Excitement, euphoria or delirium may precede weariness, fatigue, sleepiness and followed by stupor and unconsciousness, coma and death from respiratory failure. Those who survive the central nervous system effects may develop bronchitis, pneumonia, pulmonary edema, and intrapulmonary hemorrhage. Aspiration may cause immediate pulmonary edema and hemorrhage. The usual lethal dose in humans is 10-15 milliliters, but smaller amounts have been reported to cause death. A single exposure may produce longterm effects with pancytopenia persisting up to a year.
CHRONIC EXPOSURE- Daily administration to humans of 2-5 grams in olive oil caused headache, vertigo, bladder irritability, impotence, gastric disturbances, and evidence of renal congestion. In female rats treated

with 132 single daily doses over 187 days, no effects were observed at 1 mg/kg; slight leukopenia at 10 mg/kg; and both leukopenia and anemia at 50 and 100 mg/kg. Oral administration to rats and mice at various dose levels induced neoplasms at multiple sites in males and females. In a one year gavage study, rats given 50 or 250 mg/kg, 4-5 days/week for 52 weeks did not exhibit acute or subacute toxic effects, but a dose correlated increase of leukemias and mammary carcinomas was observed; some other tumor types were also reported. Reproductive effects have been reported in animals.

METHYL TERT-BUTYL ETHER:
NARCOTIC.
ACUTE EXPOSURE- May cause gastrointestinal tract irritation and discomfort. If sufficient amounts are ingested, central nervous system depression may occur. Laryngeal, ocular, and respiratory muscles may be affected in severe poisoning.
CHRONIC EXPOSURE- Symptoms of acute exposure may be produced by chronic ingestion.

SECTION 12 ECOLOGICAL INFORMATION

ENVIRONMENTAL IMPACT RATING (0-4): no data available

ACUTE AQUATIC TOXICITY: no data available

DEGRADABILITY: no data available

LOG BIOCONCENTRATION FACTOR (BCF): no data available

LOG OCTANOL/WATER PARTITION COEFFICIENT: no data available

SECTION 13 DISPOSAL INFORMATION

Observe all federal, state and local regulations when disposing of this substance.

Disposal must be in accordance with standards applicable to generators of hazardous waste, 40 CFR 262. EPA Hazardous Waste Number D001.
100 pound CERCLA Section 103 Reportable Quantity.

Benzene - Regulatory level: 0.5 mg/l (TCLP-40 CFR 261 Appendix II) materials which contain the above substance at or above the TCLP regulatory level meet the EPA toxicity characteristic, and must be disposed of in accordance with 40 CFR part 262. EPA Hazardous Waste Number D018.

SECTION 14 TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
Gasoline-UN 1203

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - Flammable liquid

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
Flammable liquid

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

SECTION 15 REGULATORY INFORMATION

TSCA STATUS: Y

CERCLA SECTION 103 (40CFR302.4): Y
BENZENE: 10 pounds RQ
SARA SECTION 302 (40CFR355.30): N
SARA SECTION 304 (40CFR355.40): N
SARA SECTION 313 (40CFR370.65): Y
OSHA PROCESS SAFETY (29CFR1910.119): N
CALIFORNIA PROPOSITION 65: Y

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40 CFR 370.21)
ACUTE HAZARD: Y
CHRONIC HAZARD: Y
FIRE HAZARD: Y
REACTIVITY HAZARD: N
SUDDEN RELEASE HAZARD: N

SECTION 16 OTHER
